

STUDIES IN TUBERCULOSIS

by

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M.D.

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MARCH 1923.



"I presume not here to deliver anything perfect..."

The thing I endeavour is to shew, by the assistance of a few years observations, how this matter stood lately with respect to
the city wherein I live."

The Entire Works of Dr. Thomas Sydenham p. 12.

Edited by John Swan M.D., London 1742.

FOREWORD

In submitting this thesis for the degree of Doctor of Medicine the writer feels that, as he graduated M.B., Ch.B., in 1901, some explanation is necessary to show why it was not presented earlier..

Very shortly after graduation he proceeded to South Africa and the varied conditions under which he worked there were not favourable to the intensive study of any special subject.

As a District Surgeon and Medical Officer to a Diamond Mine numerous cases of tuberculosis, of very different types, came under his care e.g. Europeans who had emigrated in search of health, miners who had contracted silicosis and later tuberculosis in the Gold Mines of the Rand, and "raw" native labourers who developed the acute fulminating form of pulmonary tuberculosis, characteristic of infants and other "virgin soil", as a result of their contact with civilisation.

Though interest in the subject had been aroused, it was not until a visit was paid to The Royal Victoria Hospital for Consumption and the Tuberculosis Dispensary in Lauriston Place, as part of the first Post-graduate Course organised by the University of Edinburgh in 1910,

that the true significance and importance of the new teachings in regard to the Treatment and Prevention of Tuberculosis were properly comprehended.

Subsequently two and a half years were spent in Edinburgh studying Public Health in general and Tuberculosis in particular.

This period included four months of residence at the City Hospital, Colinton Mains, in clinical charge of the wards devoted to the care of advanced cases of phthisis, under the supervision of Dr. Alexander James.

Three months were spent in the study of tuberculosis, from the administrative and clinical points of view, at the Leith Tuberculosis Dispensary and the wards of the East Pilton Hospital under Dr. William Robertson now Medical Officer of Health of Edinburgh.

Lastly a special course of lectures and demonstrations, given by Sir Robert W. Philip and his assistants, was attended and the writer came to realise that Pliny's well known dictum "*Ex Africa semper aliquid novi*" might, with suitable amendment, be very appropriately applied to Tuberculosis.

Appointed, in February 1913, the first Tuberculosis Officer of the City of Newcastle-upon-Tyne, the writer

was given a free hand by the Medical Officer of Health, Dr.H.Kerr, in the organisation of the new department and has had ample opportunities since to study the local problem.

The matter selected for this thesis is arranged under three headings :-

- (1). A Survey of Anti-Tuberculosis work in Newcastle-upon-Tyne.
- (2). Observations on the Deaths from Tuberculosis.
- (3). The Inter-Relations of Influenza and Pulmonary Tuberculosis.

The first two sections deal, more or less, with the organisation and routine work of the Dispensary; special attention was paid to the subject of the third section expressly for the purpose of this Essay.

The writer gratefully acknowledges his indebtedness to his mentors and teachers, especially those already mentioned, and has no apology to offer for the choice of this subject as Edinburgh, which is the "Mecca" of the Tuberculosis Specialist, has always been in the van of the Anti-tuberculosis movement and the University has recognised the importance of its special study, having very appropriately appointed the inaugurator of the "Edinburgh System" to the first chair of Tuberculosis ever founded.

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A SURVEY OF ANTI-TUBERCULOSIS WORK IN NEWCASTLE-UPON-TYNE

Although the foundations of the "Edinburgh System" were laid in 1887, in which year the first Tuberculosis Dispensary began to function, relatively little attention was paid, elsewhere in Great Britain, to the question of attacking tuberculous, inevitable disease before the beginning of the 20th Century.

SECTION I.

"The National Association for the Prevention of Consumption and Other Forms of Tuberculosis" had been founded in December 1898; but A SURVEY
of
ANTI-TUBERCULOSIS WORK IN NEWCASTLE-UPON-TYNE

Interest in anti-tuberculosis work (prophylaxis and treatment) was aroused throughout the country and, in

"Tradition and authority are good things,
but experience is better."

(Sir George Newman)

to provide a Sanatorium for the district. In June 1902 a subscription list was opened and by the end of 1903 enough money had been raised to warrant the commencement of building operations. A site was selected at Burnside, 650 feet above sea level, and the institution was planned to accommodate 50 patients, with a separate room for each.

In 1902 the Poor Children's Holiday Association and Rescue Agency, which had been doing valuable work in the

A SURVEY OF ANTI-TUBERCULOSIS WORK IN NEWCASTLE-UPON-TYNE

Although the foundations of the "Edinburgh System" were laid in 1887, in which year the first Tuberculosis Dispensary began to function, relatively little attention was paid, elsewhere in Great Britain, to the question of attacking tuberculosis as a preventable disease before the beginning of the 20th Century.

"The National Association for the Prevention of Consumption and Other Forms of Tuberculosis" had been founded in December 1898; but its first really important action was the organisation of the memorable British Congress of Tuberculosis in 1901.

Interest in anti-tuberculosis work (prophylaxis and treatment) was aroused throughout the country and, in March 1902, the Newcastle-upon-Tyne and Northumberland Branch of the National Association resolved to take steps to provide a Sanatorium for the district. In June 1902 a subscription list was opened and by the end of 1906 enough money had been raised to warrant the commencement of building operations. A site was selected at Barrasford, 650 feet above sea level, and the institution was planned to accommodate 50 patients, with a separate room for each.

In 1908 the Poor Childrens' Holiday Association and Rescue Agency, which had been doing valuable work in the

City for many years, opened at Stannington a Sanatorium for children, believed to be the first of its kind in England.

In the meantime the late Medical Officer of Health, Dr. Henry E. Armstrong, had been conducting a vigorous campaign against the sale of the flesh of tuberculous cattle; although many attempts were made, by members of Parliament and others, to curb his activities in this direction.

In 1906 Dr. Armstrong presented to the Sanitary Committee a very valuable report entitled "Tuberculosis: Its Casualties, Causes and Control," which was largely a criticism of the Report of the Royal Commission on Tuberculosis issued in 1898.

He was of opinion that the recommendations with regard to the milk and meat from tuberculous cattle were not sufficiently stringent and he laconically described them as "milk and water".

In this Report he made a convincing attack upon the official doctrine that tuberculosis could be regarded as a "localised disease," and advised, among other things, the building of a public abattoir and the obligatory elimination of bovine tuberculosis, through the medium of the tuberculin test. He also urged upon the City author-

ities the introduction of compulsory notification of cases of tuberculosis and the provision of a Tuberculosis Dispensary, a Sanatorium for early cases and a Hospital for advanced cases. Further he recommended that propaganda work should be instituted with a view to improving general hygiene, and advocated the establishment of a "Supreme National Health Authority" representative of all the Sanitary Authorities in the Kingdom.

As a result of action taken in respect of the last item "The National Union of Public Health Authorities" was formed.

Another consequence of this report was the leasing by the Corporation, in 1908, of twenty beds at the newly built Sanatorium at Barrasford.

In 1910 public interest in tuberculosis was further stimulated by the visit of the Exhibition of the National Association for the Prevention of Consumption and Other Forms of Tuberculosis to the City.

The exhibition was open for two weeks (July 25th - August 6th, 1910), and was inspected by 25,816 persons; while 4,042 individuals attended the lectures given in connection with it.

The passing of the National Insurance Act marked

a new era in anti-tuberculosis effort for, as the Sanatorium Benefit clauses were due to take effect from July 1st, 1912, it was necessary to make preparation for the work to be carried out.

In March 1912 the City Council approved of the provision of a Tuberculosis Dispensary but, owing to the difficulty of securing suitable premises, nothing was done until February 24th, 1913 when the present writer was appointed first Tuberculosis Officer to the City.

Under a special section of the "Newcastle-upon-Tyne Corporation Act, 1911" all cases of pulmonary tuberculosis in the City were compulsorily notifiable from January 1st, 1912, and on February 1st, 1913 the Tuberculosis Regulations 1912, enforcing the obligatory reporting of all cases of tuberculosis, came into operation.

The newly appointed Tuberculosis Officer had to act as Medical Adviser to the Insurance Committee and was at once called upon to assist in the preparation of a "Combined Scheme" for dealing with all cases of tuberculosis in the City.

The National Insurance Act, 1911, had provided that 1/3d. per annum per insured person should be allotted to "Sanatorium Benefit", and of this sum 6d. per head was to be paid to the panel doctor for Domiciliary Treatment of

tuberculous "insured persons".

After certain deductions for drugs and administration expenses the balance, which was not to be less than 7½d per insured person, was to be handed over, yearly, to the Corporation, who guaranteed to carry out the "Combined Scheme": the cost of which, over and above the Insurance Committee's contribution was to be borne equally by the City Council and H.M. Treasury.

Under the agreement the Corporation contracted:-

- (a). To establish, equip, staff and maintain a Tuberculosis Dispensary.
- (b). To provide 120 sanatorium and hospital beds for tuberculous cases; it being expressly stipulated that at least 20 of the sanatorium beds should be reserved for "insured persons."

The writer, having commenced his duties on February 25th, 1913, had to set about organising the new department, and it is now proposed to deal briefly with the question of premises and staff and then relate the routine as gradually evolved and practised at the time of writing (February 1923).

PREMISES.

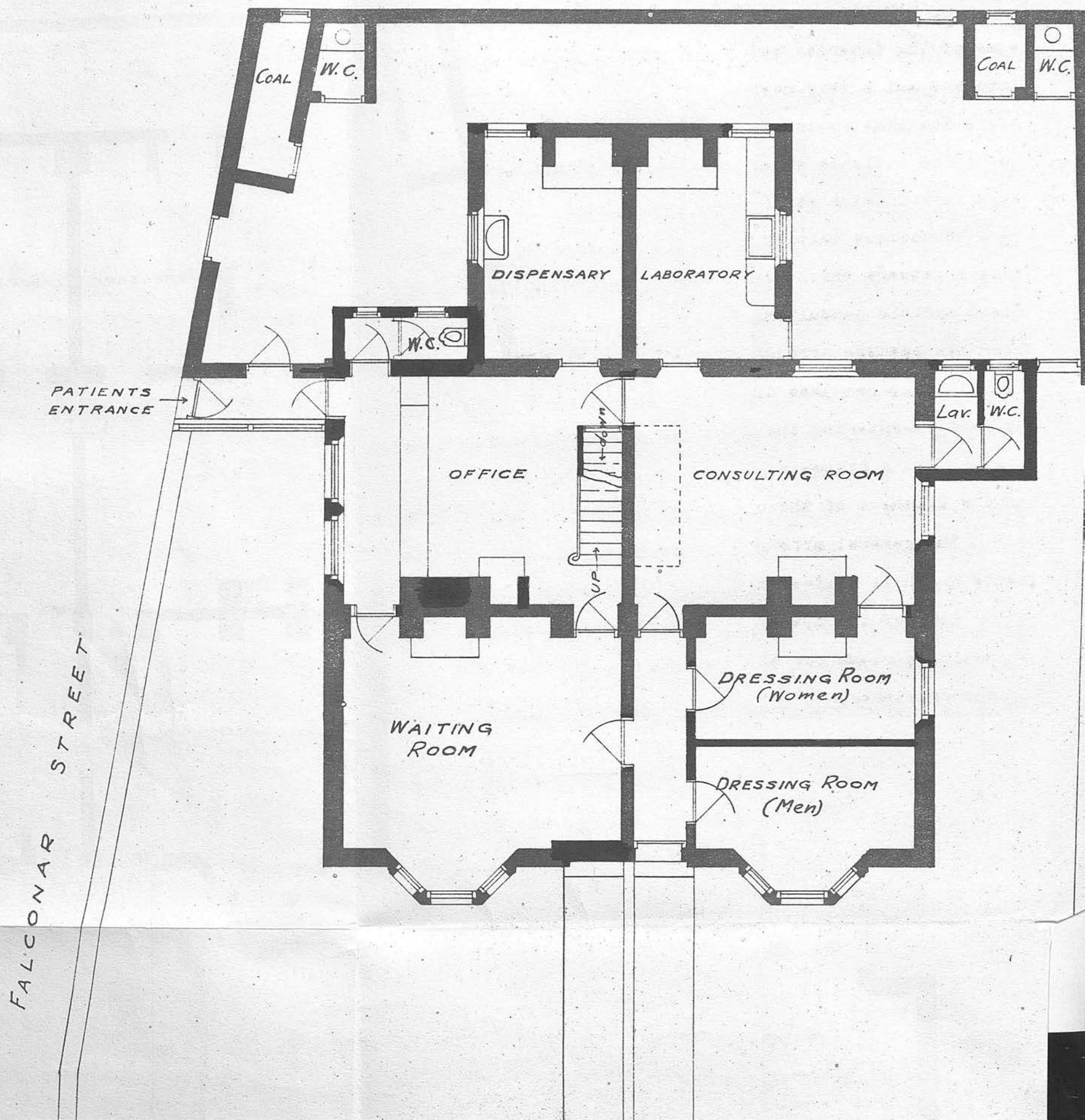
Originally two small rooms in the Town Hall were used

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but the accommodation was much too limited, and proved very unsuitable in many other respects e.g. as regards heating and ventilation, situation (abutting on a noisy thoroughfare), etc.

Enquiries were made for suitable properties but opposition was met with at every turn. In this connection it is interesting to relate that at one time the Sanitary Committee seriously considered the acquisition of a large house centrally situated and not far removed from the residences of some of the senior physicians and surgeons of the City. A storm of protest was raised and a deputation of "consultants" waited on the City Council and opposed the proposal, largely on the grounds of the danger of infection. They were however rebuked into silence by Councillor Stableforth, Chairman of the Sanitary Committee, who pointed out that if the same patients, whom they professed to regard as dangerous, were only able to pay, they would be welcomed not in the neighbourhood, but actually in the houses of the consulting physicians.

Eventually two semi-detached villas in a central position, on a main car~~r~~ line, and conveniently situated as regards the principal tram services of the City, were acquired and adapted, under the writer's supervision,

AMENDED PLAN



for their new purpose.

By removing one of the flights of stairs and some of the interior walls, the two houses were thrown into one and a very useful and convenient suite of rooms was thus contrived.

The patients enter through the office, but are separated from the staff by a long counter, and then pass to a commodious waiting room. From this, a door opens into a passage which gives entrance to the two dressing rooms and the consulting room; but the female dressing room has been so arranged that the women, when ready for examination, can pass direct into the consulting room without re-entering the passage. A well equipped laboratory and a dispensary have been provided by conversion of the kitchens of the original dwellings.

The general arrangement is shown in the plan opposite which is self-explanatory.

Some of the upstairs rooms are used as store rooms or retiring rooms for the staff and others are occupied by the caretaker.

STAFF.

The first member of the staff was one of the clerks from the Health Department, who had previously been responsible for the registration of the notifications re-

ceived under the Tuberculosis Regulations of 1908 and 1912, which records he brought with him into the new Department.

He is still at the Dispensary as chief clerk and the writer cannot speak too highly of his reliability, efficiency and accuracy, qualifications so necessary where careful records have to be kept.

Soon a nurse who had had special training in the "Edinburgh System" under Sir Robert Philip, was appointed and later a second nurse, who had worked for many years at the Royal Victoria Hospital for Consumption, was added to the numbers.

The staff has gradually increased until at the present date there are two clerks, one superintendent nurse, who is fully occupied in the Dispensary, and four visiting nurses who also assist, in rotation, at the clinics. In addition, a lady dispenser comes up from the City Hospital three half days a week.

With reference to medical staff the writer had no help until April 1919, when an assistant Tuberculosis Officer was appointed to take clinical charge of the Tuberculosis Pavilions at the City Hospital and assist in the work of the Dispensary as required.

An excellent and capable staff has now been collected,

the members of which work together harmoniously, and the writer is pleased to take this opportunity of expressing his appreciation of their individual services which have contributed in a very large measure to the success of the Tuberculosis Dispensary. School Medical

THE DISPENSARY ROUTINE. the Tuberculosis Office

The writer being imbued with Edinburgh methods organised the work, from the outset, on Edinburgh lines, adapted to local conditions, and eventually evolved the system now to be described. In addition to the Dispensary

The Dispensary is open from 9 a.m. till 5 p.m. on week days (Saturday 9 a.m. until 12 noon) and on Wednesday from 5-30 p.m. until 8 p.m. for the convenience of those working by day. In addition to the Dispensary

In planning out the work due regard has been paid to the convenience of the patients and the necessity of making the best use of the staff available. Clinics and

Clinics are held each morning; the Monday, Wednesday and Friday sessions ^{are} being devoted to male patients and the Tuesday and Thursday sessions to females, while the Saturday morning is reserved for children attending school. Patients visited by them on the previous day, should

Clinics are also held on two afternoons namely, Tuesday and Friday, the former for women patients, who

sometimes find it difficult to leave home in the forenoon, and the latter for children of school age who are unable to attend school. By arrangement with the Principal School Medical Officer the Friday afternoon clinic is presided over by one of the Assistant School Medical Officers who can refer cases to the Tuberculosis Officer for a special opinion if thought desirable. This arrangement is of special convenience to the parents of delicate children as it obviates the necessity for them attending the school clinics in addition to the Dispensary.

An evening session, for the benefit of those working, or unable, for some other reason, to attend the forenoon or afternoon clinics, is held on Wednesday which is the local half holiday.

The Assistant Tuberculosis Officer takes charge of the Tuesday afternoon and Saturday morning clinics and assists at the other sessions as required.

The Tuberculosis Officer personally conducts the remaining six clinics and the rest of his time is devoted to other duties e.g. taking the daily reports of the nurses on the cases visited by them on the previous day, microscopical examination of sputa, correspondence and reports relating to the work generally, home visiting of patients,

attendance at the Tuberculosis Wards at the City Hospital in a consultative capacity etc.

In order to prevent congestion all patients, excepting those attending the special sessions for school children, are seen by appointment. A minimum of fifteen minutes is allowed for an examination of the chest or larynx and five minutes per case under observation, or receiving medicinal treatment.

The majority of patients attending the Dispensary are referred thither by general practitioners, the school medical officers, the Lady Almoner of the Royal Victoria Infirmary, The Fleming Memorial Hospital, Newcastle-upon-Tyne Dispensary, Citizens Service Society, Local War Pensions Committee etc., but a considerable number come as a result of the domiciliary visit of one of the nursing staff after notification. By arrangement with the local profession a notification is regarded as an application, on the patient's part, to participate in the local anti-tuberculosis measures, unless the contrary is definitely stated, on the form, at the time of certification.

Needless to say, if the practitioner in attendance on any case requests that the patient be not visited by the Dispensary staff, his desires are strictly complied with, for it is essential to cultivate and maintain cordial relations with

instance (see appendix).

all the doctors practising in the City.

When a new case arrives for examination the name is first entered in the Dispensary Register, which is arranged in book form. (see appendix).

In addition to the usual columns for address, age, status as to insurance, date of notification, (if notified) etc., a space is left for insertion, later, of the classification, if the patient is found to be tuberculous, or the provisional diagnosis, if no evidence of clinical tuberculosis is detected.

This must be completed within two months of the date of entry, and serves as a valuable check, in later months or years, on the diagnostic acumen of the medical staff.

The records relating to each individual patient consist principally of two items namely :-

(1). The "case-sheet" which is as brief as possible, but is designed to cover all the points that require consideration in coming to a correct diagnosis.

(2). The environmental particulars, which are registered on a separate form and serve as the basis of "after-care" and prophylaxis.

Sheets of foolscap size are used in each instance (see appendix).

If the new patient has already been visited by one of the dispensary nurses, the "environmental record" is procured from the nurse's file; otherwise the particulars are taken at the Dispensary and checked and supplemented later by the district nurse when she visits the patient's home.

After the dispensary number and personal particulars (name, age, occupation etc) have been entered on the "case-sheet" by one of the clerical staff, the nurse counts the pulse, takes the temperature, registers the height and weight, and then questions the patient regarding the duration of his illness, first symptom, present complaint, personal history as to previous illnesses and treatment received and family history as to tuberculosis, the answers being noted in appropriate spaces.

The standard weight, by which is meant the usual weight in adults and the average for age and sex in children, is recorded for comparison with that at the time of examination.

The rest of the case-sheet is reserved for the medical findings arranged under headings e.g. General Condition, Respiratory, Alimentary, Haemopoietic, Circulatory, Genito-Urinary, Locomotory and "Other" Systems, with a space at the foot for "Recommendation".

The extreme right margin is utilised for block diagrams of the chest, a space for classification or diagnosis and a small table for the results of sputum examinations.

The reverse side is ruled horizontally and is used for subsequent visits of the patient to the Dispensary.

Columns are provided for date, weight, notes on progress etc., and recommendation as to treatment. The dates of admission to, and discharge from, institutions are also here recorded, red ink being used for this purpose.

Stout manilla folders, bearing identification and other particulars, are used to contain and protect the case sheet and other documents relating to each patient.

They are filed alphabetically and serve as a card index of the patients in attendance at the Dispensary.

On the inside of the folder a special table is printed for insertion of the results of further sputum examinations. (see Appendix).

When tubercle bacilli have been found in the sputum of any patient, his folder is marked distinctively with a red pencil and such cases are filed separately.

Before examining the patient the Tuberculosis Officer scans the history and environmental particulars, amplifying such points as he deems necessary by direct interrogation.

The patient is then examined and the findings recorded. A provisional diagnosis is made and entered, in pencil, in the appropriate space and specimens of urine and sputum, if available, are requested.

If the case is urgent a letter is written to the general practitioner in attendance and handed to the patient, the action taken being noted and a carbon copy of the letter kept.

Usually, however, it is found more convenient to delay communicating with the medical attendant until the next visit of the patient, by which time the results of urine and sputum examinations are known and, if a temperature record has been kept, this can also be studied.

The interval to elapse before the next visit is jotted down on the case sheet and prior to the patient leaving the Dispensary, a definite appointment is made, the day, date and hour being written up on his attendance card by one of the clerical staff who makes a corresponding entry in the appointment book.

After the first examination the "environmental"

record is removed from the folder and handed to the visiting nurse for the district in which the patient is domiciled.

This environmental record, for which a different coloured paper is used, is supplemental to the case-sheet but is allowed to overlap it in some respects; the reason for this is that frequently no other particulars are obtainable, some patients being bed-ridden when notified while others are unwilling to attend the Dispensary.

On the front of the form provision is made for identification particulars, date of notification, part affected and name of doctor notifying, personal and family history with special reference to tuberculosis, occupational particulars e.g. precise nature of work, where employed, whether able to work (or attend school) and, if not, how long, previous occupation and any exposure to unfavourable conditions at work.

Then follow particulars as to home conditions e.g. number of dwelling rooms, type of house occupied, number of inmates with details as to age and sex, with a brief note as to their general health, the sleeping arrangements of the patient, note of any precautions taken to deal with sputum, disinfect handkerchiefs etc., and the sanitary conditions of the premises as to ventilation,

light, dampness etc. columns for the months, each

A space is left at the foot for "any further remarks", and if tubercle bacilli have been found in the sputum this is indicated in a prominent position, namely in the right hand top corner. the patients "environment-

The back of the sheet is used by the visiting nurse for reporting on subsequent visits to the patient and is provided with columns for date, temperature (bed ridden cases) and brief notes as to progress, change in sleeping arrangements, financial embarrassment, health of contacts, insanitary conditions arising in the home etc.

These forms are retained by the respective nurses as long as the patients to whom they refer continue in attendance at the Dispensary and, being filed alphabetically, are always available for reference at a moment's notice. by the "Voluntary Tuberculosis Care Council" with

In case of death, however, or if the patient leaves the City, they are filed with the other documents in the folder. insanitary condition is found to exist in a

From these forms each district nurse prepares her own register in a stout note book with one or more entries for each street, the left hand page being reserved for patients' names and number of the street, while the right

is ruled into twelve columns for the months, each visit being recorded in the appropriate space.

The visiting nurse makes up her daily list from this street register and on her return to the Dispensary enters up her notes on the patients "environmental" record.

The following morning, between 9 and 10 a.m., she reports on her day's work to the Tuberculosis Officer who goes over the cases one by one asking for further information when necessary and making pencil notes of suggestions as to interval to elapse before next visit etc.

If the home conditions are such as to render the proper nursing of the patient impossible the question of admission to Hospital may arise; if it is simply a matter of financial embarrassment the case can be referred to the "Voluntary Tuberculosis Care Council" with which the Dispensary is in intimate contact.

When overcrowding, serious structural defect or any other insanitary condition is found to exist in a patient's home, the facts are recorded in a special "Complaints Book" and transmitted, by telephone, to the Medical Officer of Health, the same day.

If the Tuberculosis Officer considers that no

further visits to any individual patient are required or advisable, the name is deleted from the street register and the "form" placed in the folder beside the other papers relating to that patient.

By this method every patient is followed up systematically as long as he is living in the City and need never be lost sight of except on the express instructions of the Tuberculosis Officer, unless, of course, he changes his address and does not intimate the fact to any of the Dispensary staff.

Examination of Contacts. This is arranged by the visiting nurses, but owing to the demands on the small medical staff in other directions it cannot be practised so extensively as is desirable.

It has, however, proved a most valuable method of discovering unrecognised cases of tuberculosis and is so important that legislation to enforce it is, in the writer's opinion, desirable.

No great hardship would be inflicted if a measure were introduced compelling the head of a household to furnish the Medical Officer of Health, after a death from tuberculosis, with a certificate stating that all the home "contacts" of the deceased had been seen by a qualified medical man and undergone a proper examination, with

the results thereof.

Such certificate would, of course, be provided free of cost at the Dispensary and in this way the majority of "contacts" in any area would come within the purview of the Tuberculosis Officer who could thus institute treatment, where necessary, at the earliest possible moment.

The ordinary case sheet outlined above is used for contacts and several can be filed together, but a separate folder is always used for each definite or notified case.

As a rule no environmental particulars are required as they are already in the possession of the Dispensary.

Laboratory Work. The urine of each new case is examined as a matter of routine; the reaction and specific gravity are determined and tests for albumen, sugar and urochromogen are applied.

This work is relegated to the nurses who also prepare and stain specimens, for microscopical investigation, of the samples of sputum submitted by the patients.

The actual examination of the slides is undertaken by one of the medical staff.

Incidentally it should be mentioned that it is a

great advantage to have this work performed at the Dispensary, for if the physical signs are suggestive of tuberculosis a more thorough search is made; with a corresponding increase in the number of positive results.

As a rule "direct smears" are made but frequently the simple method of "auto-digestion" by incubating the entire sample of sputum at 37 ° C. for 24 hours or longer, as suggested many years ago by Sir Robert Philip, is used with satisfactory results.

Occasionally other concentration methods are employed but have not been found, by the writer, to be of any very great value.

The routine method of staining is to immerse the slides over-night in carbol fuchsin (at room temperature in warm weather; in the incubator during the winter) and finish off in accordance with the usual Ziehl-Neelsen procedure next day.

If the result is desired more urgently the slides are immersed in carbol fuchsin in a Borrel's tube and heated in a water bath.

When tubercle bacilli are found in the sputum of a patient he is supplied with a sputum flask and a reasonable quantity of disinfectant, as required, at the Dispensary.

The Work of the Clerical Staff. This constitutes a very important part of the Dispensary routine as it includes the fixing of appointments, the keeping of the various registers, the handling and safe-keeping of all correspondence, the filing of all the case records and the preparation of daily, weekly, monthly and yearly returns, many years after the original notification.

The notifications are received daily from the Health Department and are filed, at the Dispensary, after the particulars have been entered in a book register.

This register is provided with columns in which the respective dates of the first visit to the patient by the nurse, and his first examination at the Dispensary can be inserted. (see Appendix)

The proportion of the notified cases visited by the nurses or who have attended the Dispensary, is thus easily ascertained; and it can be seen at a glance to what extent the Dispensary is keeping in touch with the local problem.

In addition to the book register a double card index is kept, one series of cards bearing the surnames and the other the names of streets. On the former the entry consists of the christian name with the number of the page of the notification book where all details can be found; while on the street cards the number of the house together

Tuberculosis Officer, ought to attend for observation with the page in the notification book are posted.
(see Appendix).

The head clerk is also responsible for extracting Indexed in this way many thousands of notifications from the weekly death returns the names, ages and addresses of all the patients certified to have died from any few duplicate cards will be required. Such a system will last indefinitely and any case can be traced, in a moment, many years after the original notification.

When a case dies the date of death is entered in the book register; the word "dead" is placed after the christian name in the "surname" series of cards but no death is marked on the front of the folder; the entry is made in the street index, which reveals at a glance the local hotbeds of tuberculosis.

Every Saturday morning the head clerk prepares for each nurse, on a special form (see Appendix), a list of the cases, living in her district, notified during the week. The names of Dispensary patients who have failed to keep their appointments are incorporated in this list, and also those of cases admitted to, and discharged from, institutions.

The date of the nurses' visit to each patient is filled in opposite the name and when the list is completed the form is returned to the clerk.

Some such system is essential in order to keep in touch with all those patients who, in the opinion of the

Tuberculosis Officer, ought to attend for observation - are known to the Dispensary on any particular date, or other purposes.

Two counts are made yearly namely on June 30th and December 31st.

The head clerk is also responsible for extracting from the weekly death returns the names, ages and addresses of all the patients certified to have died from any form of tuberculosis.

These are entered in a special death register and the necessary "cross" entries are made in the other registers.

A daily record is kept of the number of patients attending the Dispensary in each category, the number death is marked on the front of the folder; the environmental record is added and the entire dossier is filed away with the other deaths of the current year, the details being tabulated later.

Disinfection of the premises, bedding etc., is arranged after a death, precisely as after admission to an institution or change of address.

Periodical Returns. As reports are required at intervals it is essential to keep the records and registers in such a manner that the information desired can be readily abstracted.

It has already been mentioned that the records of the living sputum positive cases are filed separately and, by a simple count, it can be ascertained how many such cases

are known to the Dispensary on any particular date. Two counts are made yearly namely on June 30th and December 31st.

For administrative purposes the cases are divided into adults and children; the age limit for a child is taken as 15 years because after the 16th birthday all individuals are eligible for the benefits of the National Insurance Act.

A daily record is kept of the number of patients attending the Dispensary in each category, the number examined, the number of visits paid by the nurses and the number of patients receiving treatment in the various institutions.

The figures are arranged in parallel columns and provision is made for 31 entries (see Appendix).

In this way the essentials of each month's work can be recorded on a single sheet of foolscap size and the years work on twelve. It is also possible, at a glance, to see how much work ^{was} done at the Dispensary, or how many beds in institutions ^{were} ~~are~~ occupied on particular dates or during any longer period of time.

The method of procedure has now been related at some length and, as the collection of statistics is one of the fundamental functions of a Tuberculosis Dispensary,

as laid down by the Departmental Committee, some details will now be presented, under various headings, the Dispensary, 136 had been visited by the nurses and to give some idea of the volume of work accomplished.

NOTIFICATIONS

Between January 1st, 1912 and December 31st, 1922 9968 primary notifications had been received, 6968 being in respect of tuberculosis of the lungs and 3000 relating to "other forms" of tuberculosis.

In the early years, owing to shortage of staff, only the "lung" cases were visited, but since January 1920 practically every case notified in the City has been visited; the only exceptions are patients living in the better residential quarters, and inmates of Common Lodging Houses.

Thus in 1922, of 775 cases notified, 620 were visited by the nurses and, of these, 459 came to the Dispensary for examination during the year.

Excluding the cases first notified in the death returns, 620 out of 691 were either visited by the nurses or examined at the Dispensary.

In January 1922 all the notifications received prior to December 31st, 1921 were reviewed and it was found that, at the latter date, ^{of} 6584 cases notified as suffering from pulmonary tuberculosis 3799 were dead,

while of those not known to be dead 1921 had attended the Dispensary, 138 had been visited by the nurses and 726 were unknown to the Dispensary.

The yearly figures are given in detail in the accompanying table and it will be observed that more than half the cases unknown to the Dispensary were notified in 1912 and 1913 i.e., before the Dispensary machinery was in working order.

	Head	Abdomen	Alveoli	Bones	Spine	Skull	Genito-Urinary	General	Military	Other Organs
1912	450	154	82	68	74	42	4	0	8	0
1913	293	54	71	55	42	14	3	1	18	2
1914	352	90	89	65	48	29	1	4	18	2

NOTIFICATIONS OF PREVIOUS YEARS OF PULMONARY TUBERCULOSIS.

Year Notified.	Primary Notifications.	YEAR OF DEATH.											NOT KNOWN TO BE DEAD.				Gross Total.	Originally notified as "Other Forms" and subsequently Lungs.
		1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	Attended Dispensary.	Not Attended Dispensary.	Visited by Nurses.				
*1912	972	356	116	49	44	22	18	17	9	9	2	140	247	...	1029	...		
1913	796	...	207	98	34	37	20	13	8	9	10	223	144	1	804	8		
1914	665	...	...	228	95	29	14	23	12	8	9	186	63	...	667	2
1915	612	...	...	...	236	74	42	14	17	9	5	155	68	...	620	8
1916	642	...	...	...	...	256	93	35	18	8	10	167	52	13	652	10
1917	590	...	...	...	...	...	244	87	22	14	14	174	32	15	602	12
1918	552	...	...	...	...	...	...	202	66	32	30	176	29	23	558	6
1919	519	...	...	...	...	...	...	...	190	79	26	182	27	18	522	3
1920	593	...	...	...	...	...	...	...	...	203	77	264	31	22	597	4
1921	532	...	...	...	...	...	...	...	...	...	200	254	33	46	533	1
Total	6473	356	323	375	409	418	431	391	342	371	383	1921	726	138	6584	54		

*Included in the gross total of 1029 for the year 1912 are 57 cases notified prior to that year.

As regards the "other forms" of tuberculosis 2720 notifications were received, and ^{the} location of the disease ~~etc.~~, is set out in the table taken from the writer's Annual Report for 1921. 31st, 1922 was 9089;

NOTIFICATIONS OF PREVIOUS YEARS OF OTHER FORMS OF TUBERCULOSIS.

Year Notified.	Number of Notifications.	Part Affected.									
		Glands.	Abdomen.	Meninges.	Bones and Joints.	Spinal Column	Skin.	Genito-Urinary	General	Miliary.	Other Organs.
1913	450	154	82	66	74	42	4	9	9	4	6
1914	293	84	71	55	42	14	3	1	16	5	2
1915	352	99	95	66	49	13	2	4	13	7	4
1916	345	123	51	71	57	15	7	5	12	...	4
1917	319	94	81	48	42	22	6	2	14	...	10
1918	267	77	51	52	38	16	10	4	14	1	4
1919	205	34	73	44	22	15	1	3	8	4	1
1920	244	45	62	53	32	15	4	5	18	5	5
1921	245	43	66	49	47	10	5	6	13	2	4
Total	2720	753	632	504	403	162	42	39	117	28	40

For the reasons given above a much smaller proportion of those "not known to be dead" were on the Dispensary Register.

In 66 instances tuberculosis of the lungs was notified after tuberculosis of some other part or organ had been reported previously.

In 34 of the cases the previous notification referred to the lymphatic glands (usually of the neck);

the site next in order of frequency was the peritoneum.

DISPENSARY PATIENTS.

The total number of new patients entered on the Dispensary Register up to December 31st, 1922 was 9089; 3633 were insured persons, 4461 were dependents of insured persons, leaving only 995 of the non-insured classes.

1793, including "contacts" and cases sent up for an opinion, were first recognised to be tuberculous at the Dispensary, equivalent to 20 per cent of all the notifications received from January 1st, 1913 to December 31st, 1922.

A large proportion (about 63 per cent per annum for the years 1920-21 and 22) do not, after careful observation, present any definite sign of active tuberculosis; though in later years it is expected that some of the "contacts" will ultimately develop the disease.

The average number of attendances per annum by patients is rather over 8,000 but it will be simpler to give the exact figures for a single year, and, therefore, the most recent is selected.

During 1922, 9137 attendances were recorded by 2363 patients; an average of 4 per patient.

The total number of complete physical examinations

was 2491, including 1147 males out of 3442 attendances, 530 females out of 1735 attendances, and 814 children out of 3960 attendances.

Thus the adults were thoroughly overhauled once in every three visits to the Dispensary and the children once in every five.

23.9 per cent of the cases had been verified bacteriologically, 40.3 per cent of the males, 30.8 per cent of the females, and only 2.0 per cent of the children below 16 years of age.

The details are tabulated below.

Result of Examination	Number who attended during the year, 1922			
	Total	Males	Females	Under 16 yrs of age
T.B. Found	564	389	157	18
T.B. Not Found	1799	576	353	870
Total	2,363	965	510	888

It has been mentioned that every endeavour is made to verify each diagnosis bacteriologically; and 1861 specimens of sputa were examined at the Dispensary during the year 1922.

Special attention is paid to the sputum positive patients (v.s.) and the number of these (alive and on the Dispensary Register) has risen yearly from 400, and

December 31st, 1915, to 578 on December 31st, 1922.

It is not, however, to be inferred from this that there has been an increase in the morbidity of tuberculosis; the explanation is that the Dispensary is getting into closer touch with all the cases of tuberculosis in the City.

Many of the patients had been in attendance since 1913 and 1914.

The preponderance of male cases (see table above) is notable; the explanation suggested is twofold namely:-

(a). Males are more liable to contract pulmonary tuberculosis than females, owing to industrial conditions, as evidenced by the death returns.

(b). The disease is of longer duration in males (see later).

The negative cases who attended the Dispensary during 1922, 1799 in number, were more evenly divided between the two sexes 1052 being males and 747 females.

The majority (¹⁰⁶⁹1069) of them were not notified and were simply contacts or suspects. The remainder had been notified and the details of the parts implicated are set out on the following page :-

Negative Cases who attended during 1922.			
Notified	Males	Females	Total
Lungs	264	193	457
Glands	65	59	124
Abdominal	29	15	44
Joints	24	17	41
Bones	13	16	29
Spine	13	5	18
Skin	2	2	4
Disseminated	5	4	9
Genito-Urinary	7	1	8
Meninges	2	3	5
Not Notified	628	432	1,060
Total	1,052	747	1,799

Unfortunately no X ray apparatus has been provided as yet, though it is confidently anticipated that the necessary plant will be forth-coming in the course of the next few months. However for some years past the Tuberculosis Officer has had the right to take patients to a consulting radiologist for investigation (by screen and plate) when he deemed that such examination was necessary or advisable.

THE WORK OF THE NURSES.

Here again the figures for the most recent year (1922) will be given.

797 new patients were seen in their homes and 10,546 subsequent visits to old patients were made

visits
making a total of 11,343/ for the year.

The actual number of individual patients on the nurses lists on December 31st, 1922 was 2,238 comprising 954 males (including 404 ex service men) 529 females and 755 children.

553 of these cases had been verified bacteriologically and, as these "open" cases are watched very carefully and visited more frequently on the whole than the "negative" cases, a special analysis of their sex, conjugal and economic status, home conditions etc., was undertaken in January 1923 for the purpose of this essay.

Below the age of 16 there were only 14 cases (4 males and 10 females) while above that age there were more than twice as many male cases as female, and above 45 years ^{of age} four times the number.

249 or over 46 per cent of the adult cases were between the ages of 20 and 35 years.

As regards conjugal status 319 were married 202 were single while 32 were widowers or widows.

426 (315 males and 111 females), roughly 78 per cent of the total, had received institutional treatment at some time or other and 254 (45 per cent) had been in Barrasford Sanatorium.

With regard to their economic status this could not be ascertained in respect of 5 patients and 81 were in institutions, but, of the 467 remaining, 198 were working or fit for work (some only part time), 235 were unable to follow any occupation but were not bed fast, while 34 were confined to bed.

Those comprised in the last category were mostly hospital cases for whom there was not sufficient accommodation available, or who were unwilling to enter an institution.

The housing conditions of 537 patients, who had been seen recently, were classed as good in 157 cases, frankly bad in 109 cases while it was reported that there was much room for improvement in the remaining 271 instances.

It is proverbial that overcrowding is rampant in Newcastle-upon-Tyne but when the sleeping arrangements were investigated a very serious state of affairs was disclosed.

Although 81, including many of the worst cases, were in institutions, there were still 202 sputum positive patients with neither separate room nor separate bed!

In 136 instances it was recorded that as a result

of the ministrations of the Dispensary Staff the sleeping arrangements had been changed for the better so the original conditions must have been most unsatisfactory.

Surely no better argument than the above figures is required for the oft repeated contention of the writer that it is more urgent to improve the homes of the working classes than to spend more money on increasing the present accommodation in Sanatoria or founding farm or industrial colonies except, of course, on experimental lines.

TREATMENT

This will be considered under the following headings:- Dispensary, Domiciliary, Sanatorium and Hospital.

DISPENSARY. While the chief function of the Tuberculosis Dispensary is to classify the cases in attendance and recommend appropriate treatment elsewhere, or keep the patients under observation during Domiciliary and after Institutional Treatment, certain necessitous cases are given medicine and special forms of therapy are practised e.g. tuberculin (injections and inunctions) and "refills" for cases undergoing treatment by means of artificial pneumo-thorax (special sessions).

The last mentioned procedure is quite safe in out-patient work as the writer found when visiting Dr.E.Rist's

clinic at the Laennec Hospital Paris in 1921 where he saw 35 out patients "refilled" during one after-noon session - each patient being "screened" before and after the introduction of the air.

DOMICILIARY. This constitutes the bulk of all treatment received (see later)

To a great extent the conditions under which it is administered are unsatisfactory and stand in need of drastic reform. In the writer's opinion a Tuberculosis Care Committee should form an integral part of every Anti-Tuberculosis Scheme and should have ample funds at its disposal.

In Newcastle-upon-Tyne, as a result of the representations of the writer, a Voluntary Tuberculosis Care Council was formed in 1921 to assist suitable cases receiving treatment at home. It is doing good work but its operations are hampered by lack of financial support.

SANATORIA. Beds are provided at Stannington Sanatorium for children and at Barrasford for adults.

(a). Stannington Sanatorium. Since 1913, thirty beds have been maintained by the Corporation at this institution and altogether 508 patients have been admitted.

Patients, under the age of 16 years, suffering from

any form of tuberculosis, are accepted for treatment.

Very few "open" cases of pulmonary tuberculosis have been sent - the majority of the "lung" cases are mostly delicate children with suspicious symptoms or signs.

Bone and joint cases, owing to the length of treatment required to secure satisfactory results, take up a relatively large amount of the available accommodation. Though, in the main, treatment is on conservative lines, operative measures are employed occasionally with a view to allowing discharge at an earlier date than would otherwise be possible; for the provision of beds is inadequate.

As in other childrens' sanatoria the results are most satisfactory and need not be further amplified.

(b). Barrasford Sanatorium. Only adults (i.e. patients over 16 years of age) with lung tuberculosis are admitted and advanced and "acute" cases are not accepted. As already stated 20/^{beds}were leased by the Newcastle-upon-Tyne Corporation in 1908 and this number was raised to 30 in 1913. During, and after the war more beds were required and a further increase, viz:- to 45 beds, was made in 1918.

On February 19th, 1921 the Voluntary Committee,

Barnasford Sanatorium

After History of Patients who received treatment

year of Discharge	Number of Patients	Positive Cases				Negative Cases				Average stay of all cases. - days
		Total	alive	Dead	not traceable	Total	alive	Dead	not traceable	
1909	55	37	5	31	1	18	3	5	10	114
1910	63	48	5	35	8	15	5	4	6	101
1911	67	51	7	39	5	16	10	4	2	97
1912	63	46	6	31	9	17	6	4	7	81
1913	81	57	9	37	11	24	6	6	12	112
1914	74	54	15	36	3	20	12	1	7	124
1915	73	54	15	32	7	19	4	2	13	146
1916	63	52	13	33	6	11	1	2	8	156
1917	64	46	15	25	6	18	10	2	6	156
1918	83	58	19	30	9	25	20	2	3	134
1919	102	86	35	42	9	16	12	.	4	133
1920	127	91	50	34	7	36	30	1	5	129
1921	106	88	54	29	5	18	14	2	2	122
1922	65	51	44	6	1	14	13	1	.	136
Total	1,086	819	293	440	87	267	146	36	85	125

N.B. The above table does not include 56 cases who received treatment in previous years.

having found it impossible to "carry on" owing to post war difficulties, presented the buildings and equipment to the City of Newcastle-upon-Tyne the only conditions being that the institution should continue to be used for the work for which it was designed.

Since 1908 1142 Corporation patients (845 males and 297 females) have completed treatment there and the immediate results were eminently satisfactory as 728 were discharged as "fit for work" and 282 improved, while only 132 left the institution "without improvement" or "worse".

The later or "ultimate" results are not so good however, showing that the improvement was not maintained after the patients' return to their old environment.

This is especially true of the sputum-positive patients for most of such cases treated in the earlier years are known to be dead or cannot be traced. The details are best shown in tabular form. (see table opposite)

It is interesting to note that 53 cases which had not been verified bacteriologically before, or during treatment, were later found to have bacilliferous sputum.

Special forms of treatment e.g. by tuberculin or artificial pneumothorax, commenced at the Sanatorium, are

continued later at the Tuberculosis Dispensary or at the Tuberculosis Wards at the City Hospital, Walker Gate. (see Appendix K).

It will be noted that no sanatorium accommodation has been provided for "other forms" of tuberculosis in adults - a serious omission which it is hoped will soon be rectified.

(c). Tuberculosis Pavilions at City Hospital. In June 1913 two small isolation wards were put at the disposal, and placed under the clinical control, of the Tuberculosis Officer.

The accommodation was insufficient and plans were prepared for a new building with 62 beds.

The new wards were opened in April 1916 and have proved the most valuable item of the "Combined Scheme."

The total number of patients treated here up to December 31st, 1922 was 1342 (979 males and 363 females).

Various types of cases are admitted but generally speaking they are patients unsuitable for treatment at Barrasford Sanatorium.

Thus when the diagnosis is in doubt patients are admitted for observation and subjected to special tests e.g. temperature reaction to exercise, diagnostic injections etc.

Emergency cases, such as sudden hæmoptysis, are also accepted.

While a large proportion of the admissions were patients with advanced or acute disease, who were unable to secure proper isolation or nursing at home, the results of treatment were often extremely good.

Treatment is on ordinary sanatorium lines namely, by means of rest and ample food under good hygienic conditions; but many cases have been treated by special methods e.g. artificial pneumo-thorax, vaccines and tuberculin.

Many chronic cases improved considerably and returned to work, while numerous helpless and hopeless cases were satisfactorily isolated without incurring the stigma of entering a "Poor Law" institution.

At the same time the home conditions were so relieved by the absence of the sufferer that the other members of the household were enabled to live in greater comfort and ^{thus} strengthen their resistance to the disease.

During the War some difficulty was experienced owing to insubordination of patients but since the appointment of an Assistant Tuberculosis Officer, who

resides at the Hospital, this trouble has practically vanished.

A special reference must be made to treatment by artificial pneumo-thorax. This has been practised by the writer since 1913 but only to a very limited extent. The early results were not satisfactory, largely because the treatment was attempted when the disease was hopelessly advanced.

However, after seeing the excellent results obtained by Professor Rist in his clinic at the Laennec Hospital, the writer has employed this method in a much wider range of cases and is satisfied that in the majority of instances great benefit has accrued to the patients.

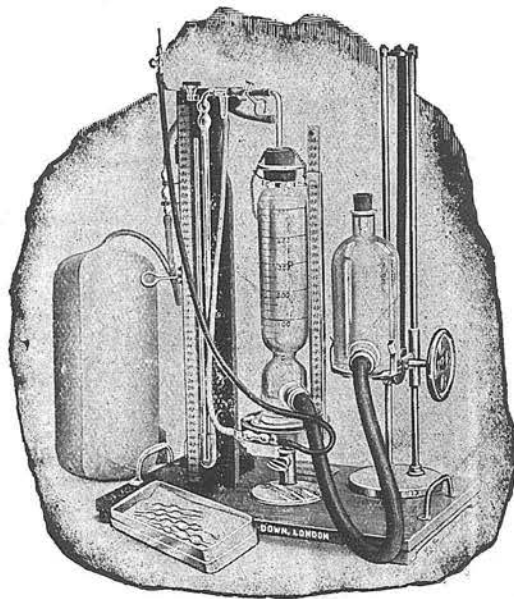
Even in advanced cases the suppression of the cough is often marvellous and the reduction in the amount of sputum is valuable from the point of view of prevention.

The treatment has been attempted in 56 cases and in 41 of these a satisfactory collapse has been obtained.

At the present time (March 1st, 1923) 29 patients are receiving this form of treatment, mostly with beneficial results.

Of course, in the majority, cure cannot be hoped for but the relief of symptoms is extraordinary.

Type of Apparatus used by Writer



Model of Dr. Russ.

Block kindly lent by Messrs Down Bros.

Some of the patients have previously had Sanatorium treatment and relapsed; in nearly every instance the present condition of such patients is actually better than after the completion of the original sanatorium treatment.

While the initial operation occupies some time, with a trained team the "refills" can be accomplished in an average of ten minutes per case, and thus fifteen to twenty cases can easily be dealt with at one session.

The apparatus employed is that designed by Dr. Kuss of Paris; it is extremely convenient and easier to manipulate than any other model seen by the writer. (see plate).

While, as above stated, the patients are, as a rule, greatly benefitted by the treatment, it must be noted that epidemic influenza seems to be specially fatal to them.

This has been observed by Burnand, Lunde, Guth and others (see Section 3), and it is significant that the writer had only two patients under his care undergoing this form of treatment, at the time of the severe epidemic of 1918 - 19, and both died of influenza.

However, they were being treated as "out-patients" and died at home so no post mortem investigation was possible.

It in this connection it should be mentioned that, whenever permission can be obtained, a post mortem examination is made of the organs of every patient who dies in the Tuberculosis Wards, with great profit to the medical staff.

(d). Other Institutions. Any case requiring special treatment is referred to the Special Departments of the Royal Victoria Infirmary, The Fleming Memorial Hospital (for children), The Maternity Hospital, or one of the other hospitals e.g., for diseases of the eye, skin etc.

Many cases also find their way to the Poor Law Infirmary (Wingrove Hospital).

SANATORIUM BENEFIT. As previously mentioned this was one of the provisions of the National Insurance Act 1911; the clauses dealing with it took effect from July 1st 1912 and it ceased to be a special benefit for insured persons after April 30th 1921.

The treatment granted was practically the same as that given to the non-insured residents of Newcastle-upon-Tyne except that some of the patients receiving Domiciliary treatment received "extra nourishment" in the form of milk and eggs.

The total number of applications received was 1864

from 1549 men and 315 women. Only 54 of the applicants were suffering from non-pulmonary tuberculosis, partly owing, no doubt, to the fact that no residential treatment was provided for the various conditions coming within this category.

The nature of the treatment is shown in the appended table taken from the writer's Official Report.

NATURE OF TREATMENT RECEIVED.										
Year of application.	Domiciliary only.	Domiciliary and Sanatorium.	Domiciliary and Hospital.	Domiciliary and Dispensary.	Domiciliary, Dispensary, and Sanatorium.	Domiciliary, Sanatorium, and Hospital.	Domiciliary, Dispensary, and Hospital.	Domiciliary, Dispensary, Sanatorium and Hospital.	No Recommendation.	Still receiving treatment on 30th April, 1921, included in other columns.
1912	36	26	4	...	2	1	...	...	4	Nil.
1913	92	49	24	4	7	5	3	...	3	3
1914	108	51	32	10	11	7	4	4	1	9
1915	76	34	29	9	12	7	3	2	3	5
1916	65	27	65	20	12	4	12	4	8	11
1917	47	22	83	10	19	13	9	7	2	17
1918	53	47	47	15	22	13	15	6	3	52
1919	61	68	59	33	7	9	2	5	3	76
1920	88	85	56	5	3	9	...	...	1	146
1921	21	22	12	...	...	1	...	...	1	52
Totals	647	431	411	106	95	69	48	28	29	371

Institutional Treatment (Sanatorium and Hospital) only amounted to 16.1 per cent of the treatment granted; the remainder was administered while the patients were living in their homes (Domiciliary 79.1 per cent, Dispensary 4.8 per cent).

Domiciliary treatment thus formed by far the largest item and, generally speaking, while receiving it the patients stood ^{most} in need of assistance and received least.

The details of the total amount of treatment received by the applicants of the various years appear in the table submitted below:-

TOTAL TREATMENT RECEIVED (IN DAYS).												
Year of Application.	Number of Applications.	Nature of Treatment.				TOTAL.	Percentage to Total Days.				Visits to Dispensary.	Nurses' Visits.
		Dom.	Disp.	San.	Hosp.		Dom.	Disp.	San.	Hosp.		
1912	73	29816	182	2891	973	33862	88.0	0.6	8.5	2.9	283	397
1913	187	99765	2519	7497	3524	113287	88.1	2.2	6.6	3.1	1908	2185
1914	228	118227	8569	10846	6975	144617	81.7	6.0	7.5	4.8	2380	3511
1915	175	70733	5601	8026	4736	89096	79.3	6.3	9.1	5.3	1655	2055
1916	217	92202	7541	9034	8010	116787	78.9	6.5	7.8	6.8	2137	2580
1917	212	85930	5469	8394	8930	108723	79.0	5.0	7.8	8.2	1775	2025
1918	221	90082	5739	11687	8674	116182	77.4	4.8	10.0	7.8	2179	1988
1919	247	64710	5350	12621	10211	92892	69.7	5.8	13.6	10.9	1917	1686
1920	247	43808	1070	10090	7453	62421	70.2	1.7	16.2	11.9	1580	1157
1921	57	1696	...	1010	563	3269	51.9	...	30.9	17.2	170	78
Totals	1864	696969	42040	82096	60049	881154	79.1	4.8	9.3	6.8	15984	17662

The writer's views on this subject may be summarised in two sentences taken from his report to the

Insurance Committee in 1920 :-

"Seven and a half years experience of "Sanatorium Benefit" has revealed to us our limitations and has demonstrated, beyond question, that too much attention has been paid to attempts to cure and far too little to those conditions which precipitate attacks of actual clinical tuberculosis and cause relapse.

By removing those conditions we shall not only reduce the tuberculosis mortality, but we shall also benefit the general health of the nation."

The National Insurance Act, 1911, marked a new era and preparation had to be made to administer the clauses relating to "Sanatorium Benefit".

The writer was appointed Tuberculosis Officer in February 1913 and was called upon to assist in the preparation of a "Combined Scheme".

The premises and the nature of the staff are described.

The Dispensary Routine is related in some detail; the source of the patients and the method of dealing with them is discussed; the nature of the records kept and the mode of filing them are described.

SECTION I.

SUMMARY AND OBSERVATIONS

S U M M A R Y.

The activities of the local branch of "The National Association for the Prevention of Tuberculosis", which culminated in the erection of Barrasford Sanatorium, are recounted.

Then an account is given of Dr. H. E. Armstrong's Report, ¹⁹⁰⁷ in which he criticised the recommendations of the Royal Commission and advocated the adoption, by the City Council, of an Anti-tuberculosis Programme.

The National Insurance Act, 1911, marked a new era, and preparation had to be made to administer the clauses relating to "Sanatorium Benefit".

The writer was appointed Tuberculosis Officer in February 1913 and was called upon to assist in the preparation of a "Combined Scheme".

The premises and the nature of the staff are described.

The Dispensary Routine is related in some detail; the source of the patients and the method of dealing with them ^{are} ~~is~~ discussed; the nature of the records kept and the mode of filing them are described.

A convenient method of keeping all patients under continuous observation is described and the importance of the examination of "contacts" is emphasised.

An account of the work of the clerical staff is given; a useful form of notification register and a simple method of registering a large number of notifications on the Card Index System, in small space, are described.

OBSERVATIONS

The question of periodical returns is discussed and the use of a special "Daily Record", whereby a synopsis of the month's work can be obtained on one sheet and the year's work on twelve, is advocated.

A survey is made of the yearly notifications, patients in attendance at the Dispensary, number of complete physical examinations, laboratory work, and ^{of} the treatment afforded at the Dispensary, in the patients' homes, at the Sanatoria, Hospital for Advanced Cases and other institutions.

Special stress is placed upon the importance of the Tuberculosis Hospital in any complete scheme and special reference is made to treatment by means of Artificial Pneumothorax.

Finally "Sanatorium Benefit" is dealt with; the results are shown to have been disappointing and it is held that the

more attention should be paid to tuberculosis in cause was the unsatisfactory conditions under which Domiciliary Treatment was administered; ⁸⁴ 84 per cent of the treatment granted was given to the patients in their homes.

Tables are presented in support of the opinions advanced and some of the "forms" in use at the Dispensary are given in an appendix.

O B S E R V A T I O N S

While present methods are, in the main, on right lines too much attention has, in the writer's opinion, been paid to attempts at cure and too little to prevention ^{not only} of actual disease, ^{but also of} ~~and~~ relapse of quiescent disease.

Further legislation is required to stop the sources of massive infection; a purer milk supply is essential and the wilfully careless consumptive must be punished.

Improved industrial and housing conditions for the working classes are also very important factors.

Propaganda to emphasise the necessity of preserving health from childhood upward are very desirable.

The results of treatment of tuberculosis among the working classes are unsatisfactory because the disease is usually recognised too late and the post-sanatorium conditions of the patients are unfavourable.



More attention should be paid to tuberculosis in the Medical Curriculum and Tuberculosis Dispensaries should be more adequately staffed and equipped (X rays facilities etc.).

Compulsory notification of pleurisy with effusion is already overdue and the writer is of opinion that the time is ripe for the consideration of the compulsory examination of the contacts of a fatal case.

The conditions under which Domiciliary Treatment is administered stand in need of drastic revision and a Tuberculosis Care Committee, with ample funds at its disposal, should be an integral part of every "Tuberculosis Scheme".

The results of treatment by Artificial Pneumothorax warrant its employment in a wider range of cases than is customary at the present time in this country.

The consumptive has great difficulty in securing work suited to his physical capacity; suitable work should be provided; if need be, by adaptation of the present day "Workhouse."

The tuberculous are, in some measure at least, the cripples of industry and the question of a more liberal allowance from the ^{Approved} ~~Friendly~~ Societies is worth considering; in any case, under present conditions, the expectation of life of a patient of the industrial classes suffering from

"open" pulmonary tuberculosis is considerably less than that of the old-age pensioner aged 70 years.

The morbidity of, and mortality from tuberculosis are both decreasing; extension of methods of prevention and treatment along the lines indicated will, it is confidently predicted, greatly accelerate the rate of decline.

OBSERVATIONS

23

EXISTING TUBERCULOSIS IN NEWCASTLE-UPON-TYNE

"La statistique, malgré ses imperfections,

donne encore le meilleur élément d'appréciation."

(L. Strauss, La Tuberculose et son Bacille, 1895).

OBSERVATIONS ON THE DEATHS FROM TUBERCULOSIS IN NEWCASTLE-UPON-TYNE

It is said that we learn more from our failures than from our successes and in the present connection the deaths from tuberculosis.

SECTION II.

A special section has therefore been devoted to:-

(A). A consideration of the distribution of the deaths as regards sex and age.

(B). An analysis OBSERVATIONS on, some of the
on
DEATHS FROM TUBERCULOSIS IN NEWCASTLE-UPON-TYNE

writer's own cognizance i.e. since 1915.

(C). A review of the death-rates from tuberculosis during the period 1894-1902.

(A). "La statistique, malgré ses imperfections, demeure encore le meilleur élément d'enquête."

Unfortunately in the earlier records the sexes were not differentiated but since 1911 the Registrar General has separated the deaths into sexes as well as age.

During the decennial period 1911-20 the number of deaths of bona-fide residents of Newcastle certified as due to tuberculosis was 5211.

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50% of the deaths were from pulmonary tuberculosis and 14% from the "other forms" of the disease and it will be convenient to consider these two categories separately.

OBSERVATIONS ON THE DEATHS FROM TUBERCULOSIS IN NEWCASTLE-UPON-TYNE

It is said that we learn more from our failures than from our successes and in the present connection the deaths from tuberculosis constitute our failures.

A special section has therefore been devoted to:-

- (A). A consideration of the distribution of the deaths as regards sex and age.
- (B). An analysis of, and notes on, some of the fatal cases which have come within the writer's own cognisance i.e. since 1913.
- (C). A review of the death-rates from tuberculosis during the period 1884 -1922.

(A). THE DISTRIBUTION OF THE DEATHS WITH REFERENCE TO SEX AND AGE

Unfortunately in the earlier records the sexes were not differentiated but since 1911 the Registrar General has separated the deaths into sexes as well as age periods.

During the decennial period 1911 - 20 the number of deaths of bona-fide residents of Newcastle certified as due to tuberculosis was 5211.

3796 of the deaths were from pulmonary tuberculosis and 1415 from the "other forms" of the disease and it will be convenient to consider these two categories separately.

1. Pulmonary Tuberculosis. Under this heading were included 2172 men and 1624 women i.e. there was an excess of males over females of roughly 33 per cent.

The explanation is to be sought in the conditions of industrial employment.

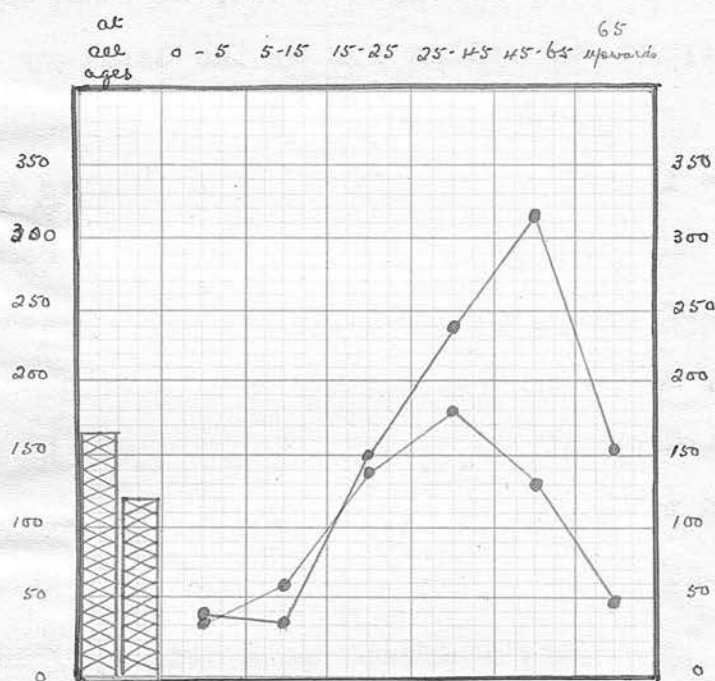
During the War there was a definite increase in the number of deaths amongst women; so much so that a special report was called for by the Sanitary Committee in 1917.

This increase was attributed mainly to the fact that such an exceptionally large number of women were employed under industrial conditions, in munition and other factories, at the time.

In this connection it is interesting to note that no case of tuberculosis has come to the notice of the writer amongst members of the W.A.A.C., or other Womens' Auxiliary Forces, although these bodies of women were recruited at a time when the increase in the number of female deaths from pulmonary tuberculosis was causing grave alarm viz:- 1917 - 18.

This would seem to show that the more satisfactory environment as regards billeting, nourishment and employment enjoyed by these girls saved many of them from developing pulmonary tuberculosis.

Chart showing the Death Rate from Pulmonary Tuberculosis.
per 100,000 living, at various Age Periods.
(Males and Females)



Males are shown in Red

Females are shown in Green

2441, or more than two-thirds of the total deaths in the years 1911 - 20, occurred between the ages of 15 and 45 years; while in the aggregate the males outnumbered the females, below the age of 25 years, there were actually more deaths amongst females than males and this was especially marked at the age period 5 - 15 years namely 160 girls to 103 boys or 0.59 per thousand living as opposed to 0.36 per thousand.

(Note. The figures used for these calculations are those of the 1911 census as the 1921 figures have not yet been published.)

Above the age of 25 years the mortality of males was much heavier; at the age period 45 - 65 years the rates per thousand living were 3.14 for men and 1.32 for women; at ages above 65 years the figures were 1.53 for males and 0.47 for females.

The variations are seen more clearly when represented graphically and a special chart has been prepared (see opposite.)

2. Non-Pulmonary Tuberculosis. The deaths were divided more evenly between the two sexes namely 733 males and 682 females.

The heaviest mortality occurred in the early years of life when tuberculous meningitis and tabes mesenterica claim

so many victims.

The death rates per thousand living at various age periods are shown in the table which follows:-

"Other Forms" of Tuberculosis

all ages		0 - 5		5 - 15		15 - 25		25 - 45		45 - 65		65 up	
m	f	m	f	m	f	m	f	m	f	m	f	m	f
0.56	0.53	2.37	2.03	0.66	0.61	0.29	0.28	0.14	0.18	0.19	0.22	0.35	0.07

(B). ANALYSIS OF, AND NOTES ON, FATAL CASES.

Since 1913 a special record of all the deaths from tuberculosis of Newcastle residents, occurring in the City, has been kept; up to December 31st, 1922 the total number of such deaths was 4762.

In 3442 instances the cause was pulmonary tuberculosis and in 1320 non-pulmonary.

Only 10 per cent of the deaths from phthisis occurred in children, i.e. individuals below 16 years of age, as contrasted with 75 per cent of the deaths from the "other forms" of tuberculosis (compare with Registrar General's figures 1911 - 20 (see A.))

With reference to sex there was again a great excess

of males among the deaths from tuberculosis of the lungs in adults, namely 1858 men and only 1200 women.

On the other hand the deaths from non-pulmonary forms were fairly evenly divided between the two sexes (696 males and 624 females).

Un-Notified Cases It is still a regrettable fact that quite a large proportion of the fatal cases of tuberculosis die before notification. Thus in 1922 11.8 per cent of the pulmonary cases had not been notified prior to death and 46.0 per cent of the non-pulmonary.

With reference to the non-pulmonary cases it has to be borne in mind that a considerable proportion of the mortality is due to tuberculous meningitis which is very frequently not recognised till shortly before death.

Also the lack of hospital accommodation for all varieties of "other forms" of tuberculosis probably plays a prominent part; for it is frequently objected that no useful purpose is served by notification unless appropriate treatment is available.

Not only do many patients escape notification but in a large percentage of the lung cases (26.7 in 1922) the notification is received within three months of the fatal issue i.e. at a time when the disease is so advanced that there is no likelihood of treatment being of any avail.

Comparative Return of Deaths from Tuberculosis
of the Lungs, occurring in :-

year of search	Persons not notified	notified under one month	Between 1 & 3 months	Between 3 & 6 months	Between 6 & 12 months	Between 12 & 18 months	Between 18 & 24 months	Between 2 & 3 years	over 3 years	Total
1913	39	36	71	49	57	29	14	2		297
1914	57	28	92	54	49	25	12	32	2	351
1915	38	46	98	47	37	32	21	24	24	367
1916	27	42	113	61	43	25	14	24	39	388
1917	55	26	97	56	47	20	17	17	38	383
1918	67	42	73	27	50	19	20	15	51	364
1919	43	62	33	29	38	19	12	19	47	302
1920	52	46	49	41	51	26	15	20	42	342
1921	56	45	42	37	46	21	13	18	48	326
1922	38	43	44	46	46	24	15	18	49	322
Total	472	415	712	447	464	250	153	189	340	3,442

The figures from one year to another show a remarkable similarity but details of the notification-death interval are given in the table opposite.

The proportion of un-notified cases is especially high in respect of children (20 - 30 per cent).

Attempts have been made through the Medical Officer of Health to secure more complete notification but a great deal of laxity still persists.

Not only does the pulmonary form of the disease cause the vast majority of the deaths but in a still greater proportion of the cases of tuberculosis attending the Dispensary is the disease located in the lungs.

Special attention is therefore necessarily given to this class of case and the subsequent remarks apply exclusively to pulmonary tuberculosis.

Bacteriological verification of Diagnosis. Practically every case notified in the City is visited by the nurses and every endeavour is made to verify the lung cases bacteriologically.

2033 of the total cases coming within this investigation (3442) had had tubercle bacilli found in their sputum; in the year 1922 positive results were recorded in respect of 205 of the 322 deaths (i.e. 63.6 per cent).

If the un-notified cases be excluded, and of course it was impossible for the Dispensary staff to get into touch with them, the percentage is 72.2 which can be regarded as fairly satisfactory.

Deaths in Institutions. Sir A. Newsholme has for many years insisted upon the benefit likely to accrue to the community by the segregation of dying cases of pulmonary tuberculosis; during the ten years under review 944 phthisical patients died in institutions viz:- 336 in the Tuberculosis Wards at the City Hospital, 599 in the Poor Law Infirmary and 9 in the Sanatoria (Barrasford and Stannington).

Duration of Illness. Considerable interest attaches to the duration of the illness in fatal cases of pulmonary tuberculosis and the estimates given by different authorities vary greatly e.g. Louis was of opinion that the average life-time of a consumptive was two years while Williams estimated the duration (amongst private patients however) at eight years.

The writer has taken careful histories of all his patients with a view to determining the duration of the illness prior to notification and subsequently; in fatal cases the two items give the total length of illness from

Duration of Illness of Persons who died of Pulmonary Tuberculosis.

year of death	A	B	C
	Males months	Females months	Both Sexes months
1913	21.6	15.6	23.0
1914	22.2	19.5	26.0
1915	33.6	26.6	26.0
1916	32.3	24.2	27.0
1917	31.4	25.2	28.0
1918	40.5	29.4	29.0
1919	42.5	32.6	33.0
1920	42.6	27.9	32.3
1921	36.0	23.9	31.6
1922	38.0	32.5	35.1

N.B. Figures in Columns A & B apply to Sputum positive adults only.

Figures in Column C apply to all deaths certified as due to Pulmonary Tuberculosis during the respective years.

appearance of symptoms till death.

Two groups of material have been utilised namely:-

- (a). All the fatal cases of pulmonary tuberculosis registered each year.
- (b). Only the known sputum positive cases dying in each year.

The results of the analysis of the two sets of figures correspond very closely as will be seen in the table submitted.

In the first place it is found that the average length of illness registered has increased very considerably since 1913 and the obvious reason is that the Dispensary has been in touch with the cases from a relatively earlier stage of their illness; latterly of course, the increased institutional accommodation provided has played an important part also.

The detailed figures are given in the table opposite.

The overwhelming majority of the cases included belonged to the industrial classes and the writer is of opinion that at the present day the duration of illness in working class adult males is rather over three years and about nine months less in the women. This longer duration of illness amongst males helps to account for the large excess of males (five males to two females) on

the "live" files of the Dispensary.

The statistics relating to the children are apt to be misleading for the numbers are small and the more chronic cases may live, to be classed as "adults". Generally speaking, however, the disease runs a much more rapid course in childhood and this is of course especially true below the age of ten years.

Unfortunately it is usually found that symptoms have existed for a very long time before the case has been notified e.g. in 1922, while the average length of time the fatal illness lasted was 35.1. months, the interval between notification and death was only 16 months, showing that, on the average, each patient presented symptoms of pulmonary tuberculosis 18 - 20 months before notification.

This only goes further to prove that some means of "speeding up" notification is necessary.

Family History. While this is very important as regards meningeal and glandular tuberculosis in children, it is of the greatest significance in respect to tuberculosis of the lungs.

Reginald Thompson in his book "Family Phthisis" stated that fifty per cent of the off-spring of a tuberculous union die of tuberculosis.

Although a great deal has been written on this subject it must be observed that concerning it there is much that is not clearly understood. For example, in the vast majority of cases, the phthisical parent and children all develop the disease within the space of a few years and hence it is difficult to believe that the child has been infected in its infancy by the parent who at that time presented no symptoms of the disease.

The suggestion is rather that some common pre-disposing cause or procatactic factor has operated on parent and off-spring at about the same time.

As an example of what is meant the history of one family is now related:-

Jas. McA. aged 62 years was notified as a case of pulmonary tuberculosis on August 10th, 1917; he never visited the Dispensary at that time but has recently been examined namely on January 1st, 1923, when he was found to have signs of "quiescent" or "arrested" disease.

In September 1920 a grand-daughter Sheila M. aged 2½ years, who was living with him, died of tuberculous meningitis.

The next victim was Mary M. aged 33 years, daughter of the first mentioned case and mother of the second; she

was notified on January 21st, 1921 and died of phthisis on June 27th, 1921.

Towards the end of 1922 three more sputum-positive cases were found among the contacts namely Bernard McA. aged 23 years and Lawrence McA. aged 31 years, sons of James McA., and Catherine McA. aged 31 years wife of Lawrence McA.

Another son of James McA. has been examined and is still under suspicion.

The first patient James McA. stated that he had had no symptoms of chest trouble before 1915.

This is perhaps an extreme case but it illustrates the terrible toll exacted by tuberculosis from one family within the space of a few years.

An interesting feature is that the nature and situation of the lung lesions were very similar in all the blood relations, points which have frequently been noticed in other families by the writer, and suggest the existence of an hereditary "locus resistens minoris".

For some reason or another e.g. owing to deaths in an institution, full details of all the 3442 cases were not available but of 3149 cases investigated it was found that some near relative was suffering from, or had died of pulmonary tuberculosis in 1182 cases i.e. 37.5 per cent.

Family History of Persons who died of Pulmonary Tuberculosis.
(verified bacteriologically)

year	Parents		Brothers or Sisters		Parents and Brothers or Sisters		Consorts		Children		Total
	m	f	m	f	m	f	m	f	m	f	
1913	5	2	7	4	5	2	1	2	2	·	30
1914	9	8	12	9	1	2	5	3	1	2	52
1915	11	12	27	9	3	5	4	3	2	1	77
1916	12	12	23	11	5	1	3	5	2	3	77
1917	11	10	23	20	4	8	2	8	5	5	96
1918	8	17	19	14	5	4	4	6	1	2	80
1919	7	6	16	17	10	5	3	4	3	1	72
1920	13	11	11	15	5	1	5	7	8	3	79
1921	5	10	20	15	·	2	6	2	5	3	68
1922	10	11	21	17	4	4	5	2	8	5	87
Total	91	99	179	131	42	34	38	42	37	25	718

Special analysis of the figures relating to sputum-positive cases only, 2033 in number, shows that a family history of tuberculosis of the lung was obtained in 718 cases namely 35.3 per cent, an almost identical proportion.

A Parental history was given in 266 cases i.e. 13.0 per cent, but it is found that the proportion of female patients giving such a history was higher than males namely 14.5 per cent as compared with 10.9 per cent. (see table opposite).

This finding is in keeping with the previous observations and tends to prove that the conditions under which men work tend definitely to increase the morbidity of phthisis among them, quite apart from the questions of heredity and familial infection.

In no fewer than 80 instances was there a history that the deceased's husband or wife had suffered from pulmonary tuberculosis and the writer is of opinion that "conjugal tuberculosis" is not so uncommon as is usually stated.

With the accurate records now available through notification etc., it is surprising to find in how many cases the spouse of a phthisical patient dies of tuberculosis, often after a lapse of several years however.

The writer now has records of 184 instances in which both husband and wife suffered from pulmonary tuberculosis; in some cases both husband and wife are dead; in others one or both are still alive with the disease.

An interesting point, which the writer has not seen mentioned previously, is that patients with a family history of tuberculosis die at a relatively earlier age on the average than those with no such history.

In this series of cases it means a difference of about seven years in favour of those without a parental history.

Again below the age of 40 years a history of parental phthisis was given in 15.5 per cent of the cases as opposed to 7.5 per cent of those over 40 years of age. Of the males who died aged 40 years or over, only 5.4 per cent acknowledged phthisical parentage.

Thus it can be safely deduced that the effects of a parental history of tuberculosis are more in evidence before middle age; which is in harmony with Brownlee's view that the "middle age" type of phthisis is due to unfavourable industrial conditions.

Conjugal Status. 2033 sputum positive cases were investigated and it was found that 1019 were married (626 males 393 females) 899 were single (524 males 375 females) and 115 were widowed (62 males and 53 females).

An interesting feature is that in only 11 instances did pregnancy occur after the finding of tubercle bacilli in the sputum. While active pulmonary tuberculosis frequently reveals itself shortly after childbirth; in the writer's experience it is very uncommon for a woman known to have "open" phthisis to become pregnant.

This paucity of material (though not generally recognised) possibly accounts for the very conflicting views of different authors on the effects of pregnancy on the course of pulmonary tuberculosis.

Incidentally it is worthy of note that, no case has come to the writer's knowledge of a pregnant "sputum-positive" woman dying before giving birth to her child.

Clinical Notes. Only brief mention will be made of some of the outstanding features.

Thus haemoptysis and pleurisy with effusion were more frequently given as the mode of onset amongst males

than females, whereas among the latter an insidious onset with anaemia was more common.

Pleurisy with effusion, as the late Sir William Osler said, puts the stamp of chronicity on pulmonary tuberculosis and it is significant that most of the cases coming under observation who developed bony lesions e.g. spinal caries or hip joint disease, after the establishment of the lung condition, dated their illness from an attack of pleurisy with effusion.

Fistula-in-ano has been recorded much more commonly in males than in females (ratio 7 to 1) and is usually found associated with disease of a chronic type.

Although the throat is examined as a routine, in very few cases has any definite hypertrophy of the faucial tonsils been detected and where this was present the type of disease was again inclined to be chronic.

In several instances however when the tonsils had been recently removed the disease was very acute in character and, in the writer's opinion, the operation should be strictly banned in all cases of pulmonary tuberculosis.

It would appear that while enlargement of the tonsils predisposes to catarrhal conditions (bronchitis) it

Persons who died of Pulmonary Tuberculosis (bacteriologically verified)
showing the Lung most affected

year	Right Lung		Left Lung		Indeterminate	
	m	f	m	f	m	f.
1916	58	20	31	24	14	7
1917	47	31	40	35	16	4
1918	64	26	42	22	11	3
1919	54	22	32	39	12	7
1920	63	15	44	47	19	3
1921	54	20	45	32	18	11
1922	62	21	45	35	16	11
Total	402	155	279	244	106	46

may have a protective or immunising influence in regard to tuberculosis of the lungs.

This is perhaps what one could expect for it is known that in a fair proportion of cases there is some tuberculous focus in the tonsil, and the modern writers on immunology insist that there must be some tuberculous lesion present in the body if the "allergic" state is to be maintained.

In any event the surgical removal of tuberculous tonsils is in opposition to the conservative methods usually employed in dealing with tuberculosis of other organs.

The final observations are in connection with the site of the lesions in the lungs. Some, e.g., Lænnec state that the right lung is first affected more commonly than the left, and others e.g. Louis and Cotton, vice versa.

The location of the disease has been noted in 1232 positive cases and every year it has been noticed that the male cases present more advanced lesions on the right side as a rule, whereas the females are more "left sided".

The details are shown in the table opposite and, if the indefinite cases are eliminated, 59 per cent of males showed more advanced disease on the right side when first examined and 61 per cent of the females more advanced

disease of the left side, to the fact that an except-

Of course no claim is made that the lung most affected was the site of the original lung focus; the majority of the cases showed extensive lesions when first seen.

No satisfactory explanation can be given; possibly the extra use of the right arm by men may render the right lung more susceptible to the spread of the disease.

Dr. Alexander James has stated that the lesions of the left upper lobe advance more rapidly than those of the right lung and that may give some clue, for the female cases usually came under observation with more extensive disease than the men.

The figures are too large to suggest coincidence and are similar year after year; and as the writer has never seen this point mentioned previously it was thought well to introduce it on this occasion.

(C). REVIEW OF THE DEATH-RATES FROM TUBERCULOSIS.

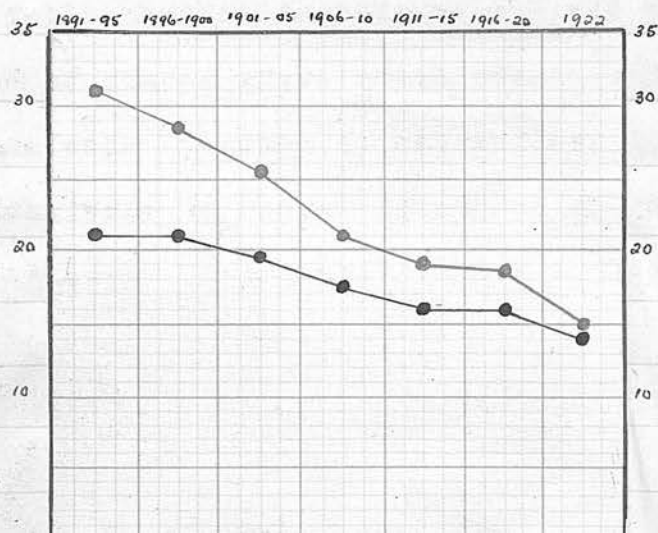
Newcastle-upon-Tyne shares with its neighbours Tynemouth, Gateshead and South Shields the unenviable distinction of having, in recent years, the heaviest death-rates from tuberculosis of all the County Boroughs in England.

This is, no doubt, largely due to the nature of the

Death Rate from Tuberculosis Compared with The General Death Rate

Period	Population	General Death Rate per 1000 pop.	Lungs		per centage of General Death Rate	"Other Forms"		per centage of General Death Rate	Total of Tuberculosis		per centage of General Death Rate
			Number of Deaths	Death Rate per 1000 pop.		Number of Deaths	Death Rate per 1000 pop.		Number of Deaths	Death Rate per 1000 pop.	
1884-5	159,546	23.6	348	2.18	9.24	157	0.99	4.22	505	3.16	13.44
1886-90	174,119	21.7	364	2.09	9.63	172	0.99	4.56	536	3.08	14.19
1891-95	192,530	20.9	386	2.01	9.61	207	1.08	5.16	593	3.08	14.77
1896-1900	206,973	21.0	398	1.92	9.14	189	0.91	4.33	587	2.84	13.47
1901-05	224,491	19.5	386	1.72	8.82	185	0.82	4.20	571	2.55	13.02
1906-10	261,080	17.6	372	1.42	8.07	182	0.70	3.97	554	2.12	12.04
1911-15	271,476	16.1	358	1.32	8.20	152	0.56	3.47	510	1.88	11.68
1916-20	279,096	15.9	385	1.38	8.68	135	0.48	3.02	520	1.86	11.70
1921	278,400	14.1	348	1.25	8.86	103	0.37	2.63	451	1.62	11.49
1922	281,600	14.2	322	1.14	8.02	100	0.35	2.46	422	1.49	10.49

Chart showing Relative Decrease in Death Rates, 1891 to 1922
Tuberculosis Death Rate per 10,000 in Red General Death Rate per 1,000 in Blue.



The decrease has been most striking in respect of the non-pulmonary forms of the disease; whereas the average yearly number of deaths from "other forms" of tuberculosis in the period 1891 - 95 was 207, in 1922, although the population had increased by roughly 50 per cent, the corresponding figure was only 100.

The general death rate declined also, of course, but not to the same extent, for while tuberculosis accounted for 14.19 per cent of the deaths from all causes in the years 1886 - 90 the corresponding figure for the quinquennium 1916 - 20 was 11.70 per cent and for the year 1922 was 10.49 per cent.

The detailed figures of population, number of deaths from all causes and from pulmonary and non-pulmonary tuberculosis, and the corresponding death-rates etc., are shown in the table submitted.

The steady decline in the number of deaths, both relative and actual, is a very hopeful feature and very encouraging to those engaged in Anti-tuberculosis work. (See chart)

With the prosecution of further efforts along preventive lines there seems every reason to believe that the rate of decline can be further accelerated.

Although no proved method of vaccination against tuberculosis is yet available and, indeed, such may never

be discovered still it is of great interest to know that in 1754, barely 50 years before the introduction of vaccination, small pox accounted for one in every ten deaths, a proportion almost identical with that exacted by tuberculosis today.

The Registrar General's figures for the decennial period 1911 - 20 are brought under survey.

It is shown that whereas only 10 per cent of the deaths from pulmonary tuberculosis occurred below the age of 16 years, 75 per cent of the deaths from non-pulmonary tuberculosis were those of children below 16 years of age.

With special reference to pneumonia there was a great excess of male deaths; below the age of 25 years however there were more female than male deaths most noticeable at the age period 8 - 15 years.

Amongst women the heaviest death rate occurred at the age period 25 - 45 years; the death rate among men was highest between the ages of 45 and 65 years and, at that age period, was more than double the female death rate.

The excess of male deaths is attributed to the combination of bad housing and unfavourable industrial conditions. The increase in female deaths during the war is held to have been caused by the number of women

SUMMARY OF SECTION II.

The subject matter is disposed under three headings:-

- (A). A consideration of the distribution of the deaths as regards age and sex.

The registrar General's figures for the decennial period 1911 - 20 are brought under survey.

It is shown that whereas only 10 per cent of the deaths from pulmonary tuberculosis occurred below the age of 16 years, 75 per cent of the deaths from non-pulmonary tuberculosis were those of children below 16 years of age.

With special reference to phthisis there was a great excess of male deaths; below the age of 25 years however there were more female than male deaths most noticeable at the age period 5 - 15 years.

Amongst women the heaviest death rate occurred at the age period 25 - 45 years; the death rate among men was highest between the ages of 45 and 65 years and, at that age period, was more than double the female death rate.

The excess of male deaths is attributed to the combination of bad housing and unfavourable industrial conditions. The increase in female deaths during the war is held to have been caused by the number of women

who engaged in munition and other work in factories at the time.

- (B). An analysis of, and notes on, some of the fatal cases which have come within the writer's own con-
 nissance 1913 - 1922.

Figures and tables are presented to show that there was great laxity in regard to notification, especially of the non-pulmonary forms of tuberculosis.

Figures are given showing the proportion of the lung cases verified bacteriologically and the number of phthisical patients who died in institutions.

The duration of the fatal illness is considered and the opinion expressed that the average length of time from onset of symptoms till death is rather over three years in the case of men and about nine months less in women.

Evidence is adduced to prove that on the average the date of notification is, in point of time, further removed from the onset of the illness than from the date of death.

Family history is discussed and an illustrative example of a "family cluster" is given.

The similarity of the lesions, as regards site in the lungs, is discussed and it is shown that the same was true.

(c). the lungs, in blood relations, is noted.

A parental history is found to be common^{er} among women and below the age of 40 years (both sexes).

Figures are given which suggest that "conjugal phthisis" is not very un-common.

The suggestion, backed by figures, is made that sputum positive women rarely become pregnant and it is held that this may give a clue to the conflict of testimony as to the effects of gestation upon pre-existing pulmonary tuberculosis.

The results of study of the individual cases indicate that haemoptysis and pleurisy with effusion are more common modes of onset in men than in women; in the latter the disease more frequently begins insidiously with anaemia.

Enlargement of the tonsils is shown to have occurred but rarely in the series of cases and the view is put forward that it is dangerous to attempt removal of these organs in cases of pulmonary tuberculosis.

Figures are presented which show that when the patients first came under observation the left lung was, on the average, more extensively diseased than the right in females, and that for the males the converse was true.

(C). A Review of the Death rates from tuberculosis in 1884 - 1922.

The returns indicate that the death rate from tuberculosis steadily decreased until 1913. During the War phthisis claimed an increasing number of victims but the decline in the number of deaths from "other forms" continued.

It is shown that after the Armistice the death rate from pulmonary tuberculosis again began to show a reduction.

In 1922 the death rate from all forms of tuberculosis was less than 50 per cent of the 1884 rate and the actual number of fatal cases recorded was much lower than in any previous year although the population had increased from 157,567 in 1884 to 281,600 in 1922.

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INFLUENZA AND PULMONARY TUBERCULOSIS

Prior to the recent pandemics the traditional view that influenza increased the morbidity of, and mortality from, pulmonary tuberculosis was accepted practically without question.

SECTION III.

Thus O. Leichmanstern (1) dealing with influenza in "Hutchinson's Encyclopedia of Practical Medicine" states:-

"The mortality tables of all countries agree in showing considerable rise in the mortality from

THE INTER-RELATIONS

of

INFLUENZA AND PULMONARY TUBERCULOSIS

With this in mind the observation of every clinician agrees, that the course of tuberculosis of the lungs is markedly and unfavourably influenced by influenza and its pneumonia complications.

"We look on nature with our eyes, not with our reason.

Latent, quiescent cases often become active.

Truth lies deep, and must be fetched up at leisure."

"Healed" or healing foot broke out anew; afebrile

(Seneca)

cases were changed to the hectic type, or to acute

"phthisis florida", and frequently haemoptysis

was induced."

J.F. Goodhart (2) writing on influenza in Allbutt &

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Rollleston's "System of Medicine" states:-

"Many a case [of tuberculosis] seemed to start from

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INFLUENZA AND PULMONARY TUBERCULOSIS

Prior to the recent pandemics the traditional view that influenza increased the morbidity of, and mortality from, pulmonary tuberculosis was accepted practically without question.

Thus O. Leichtenstern (1) dealing with influenza in "Nothnagel's Encyclopedia of Practical Medicine" stated:-

"The mortality tables of all countries agree in showing considerable rise in the mortality from pulmonary tuberculosis in influenza periods. With this fact the observation of every clinician agrees, that the course of tuberculosis of the lungs is markedly and unfavourably influenced by influenza and its pneumonic complications. Latent, quiescent cases often became active, "healed" or healing foci broke out anew; afebrile cases were changed to the hectic type, or to acute "phthisis florida", and frequently haemoptysis was induced."

J. F. Goodhart (2) writing on influenza in Allbutt & Rolleston's "System of Medicine" stated:-

"Many a case (of tuberculosis) seemed to start from an attack of influenza, and many a case of phthisis was certainly sent on its way with an alarming

increase in the rapidity of its progress." in the past.

Similarly Edward R. Baldwin (3) in Osler's "System of Medicine" wrote: "les mêmes questions renaissent

"Influenza is a frequent and important agent in bringing latent tuberculosis to light." "pres les

"Influenza must be classed as an important exciting cause (of tuberculosis) if not a true predisposition."

Numerous other quotations in the same strain could be cited and thus when the serious outbreak of influenza occurred in 1918, it was confidently predicted that tuberculosis morbidity and mortality would be seriously increased. "Patients are no more liable to suffer

Such a visitation as the influenza pandemic of 1918 - 19 naturally caused a great stir in medical circles and an enormous literature, consisting of special reports, monographs and contributions to the professional journals, has arisen. "by of Health and the Registrar

A great opportunity was offered to review the opinions previously expressed on the inter-relations of influenza and tuberculosis and perhaps the most remarkable feature was the great divergence of the views of the different writers. "of the two British journals devoted

Such a difference of opinion could perhaps have been

been anticipated, having frequently occurred in the past, for in 1837 Bouvier (4) wrote :-

"On l'a dit justement, les mêmes questions renaissent à chaque épidémie catarrhale, et leurs solutions diverses se reproduisent chaque fois à peu près les mêmes."

Thus Sir John Moore (5) writing in January 1919 stated:-

"Influenza is a perilous complication of pulmonary consumption."

On the other hand, Professor Fishberg (6a) discussed the subject fully in November 1919 and concluded that :-

"Tuberculous patients are no more liable to suffer from influenza than persons with healthy lungs, and, when phthisical patients contract influenza, the acute complicating disease is not likely to run a more acute, severe and fatal course than (in) others."

Although the Ministry of Health and the Registrar General published extensive and valuable reports on the epidemic, it is rather surprising that very few articles dealing specifically with influenza and tuberculosis appeared in the medical press of this country, and it is noteworthy that in neither of the two British journals devoted exclusively to tuberculosis, has any original contribution

dealing with the subject appeared up to date.

On the contrary, it excited considerable attention abroad and this is reflected in the extensive literature which now exists.

As above mentioned, the views of the various exponents were very conflicting and it is now proposed to review them as briefly as possible and then to relate the present writer's personal experiences and investigations in Newcastle-upon-Tyne, with a final summing up of the conclusions come to as a result of all the evidence available.

DIGEST OF THE RECENT LITERATURE.

For the sake of convenience this will be classified under four headings viz:-

- (1). Influenza in General.
- (2). Influenza as an Activator of Latent Tuberculosis.
- (3). Incidence of Influenza on the Tuberculous. (13)
- (4). The Effects of Influenza on Tuberculous Patients.

1. INFLUENZA IN GENERAL.

In November 1918 an important discussion on influenza was initiated by the Royal Society of Medicine.

It was held on two successive days and the views of many physicians, British and American, are recorded in the official "proceedings" (7).

In 1919 Dr. J. C. Dunlop (8) Superintendent of Stat-

istics issued a special report on the mortality in Scotland resulting from the influenza epidemic of 1918-19, and in 1920 a similar report was presented to Parliament by the Registrar General dealing with the mortality in England and Wales (9).

In 1919 The Medical Research Committee published a series of "Studies of Influenza in Hospitals of the British Armies in France 1918(10), and in 1920 a special report was issued by the Ministry of Health (11). The last mentioned is very comprehensive and is a veritable mine of information relating to the incidence, clinical features etc., of influenza not only in England but in Europe generally and all the other continents.

A valuable monograph, consisting of a series of essays, edited by Crookshank (12) appeared in 1922 and the subject is reviewed in considerable detail by Vaughan (13) in his book "Epidemiology and Public Health".

No part of the world escaped and the incidence of the disease has been computed as between twenty and thirty per cent of the population, in most areas, but in some it was less, e.g. at Framingham, United States of America, (14) about ten per cent, whereas in South Africa it was estimated that forty six per cent of the native population were affected (11), p. 363)

On board ship the attack rate was occasionally very high, e.g. it is recorded that of a total of 163 persons on the S.S. Atua bound from New Zealand to Australia in the autumn of 1918, 88 were stricken down with the disease, i.e. over fifty per cent (11).p.58).

The mortality rate also showed great variation but as a rule was between two and eight per cent of the individuals affected.

In some of the military establishments the type of disease was very virulent and Vaughan has recorded (loc cit p. 334) that the mortality in six of the large United States Army Camps during one week in October 1918 was equivalent to the appalling death rate of 652 per thousand per annum !

According to the official reports, the number of deaths registered as due to influenza in England and Wales, was 139,388, the corresponding figure for Scotland being 17,575.

These totals however probably under estimate the toll of the epidemic.

An enormous amount of research work was instituted at home and abroad by British and foreign investigators with a view to discovering the specific organism. The outstanding feature was that the B.Influenzae

(Pfeiffer) was discredited as the causal agent and came to be regarded as one of the many secondary invaders, e.g. streptococci, pneumococci etc., which contributed to the fatal issue in most cases.

As Hector Mackenzie (15) put it, the influenza virus can be likened to the unclean spirit mentioned in the Scriptures which "taketh unto himself seven other spirits more wicked than himself and they enter in and dwell therein; and the last state of that man is worse than the first."

Mention must here be made of the views of Hamer (16) who compared the epidemiological features of the past few years with the experiences of the older writers (Sydenham, Willis and Creighton) and contended that influenza, cerebro-spinal fever, acute poliomyelitis and epidemic encephalitis were only different manifestations of disease, produced by a common infecting agency or virus.

No method of preventing the spread of the disease was discovered, and the great pandemic left us as helpless, in this respect as we were in 1918.

However, most observers believed that one attack did confer a certain degree of immunity although of a somewhat evanescent character.

Many investigators have maintained that the organism of influenza is a "filter-passer" and if the recent claims of Olitsky and Gates (17) of the Rockefeller Institute, New York are substantiated it is possible that some product of the filtrable "Bacterium Pneumosintes" may be of value for prophylactic inoculation during epidemic periods.

It was believed in some quarters that vaccines prepared from the organisms of secondary infection prevented the appearance of pulmonary complications in many cases.

2. INFLUENZA AS AN ACTIVATOR OF LATENT PULMONARY TUBERCULOSIS

In America Bloomfield and Mateer (18) investigating the Von Pirquet test found that, like measles, influenza caused the "allergic" skin reaction to disappear for several days and formed the opinion that, during the acute phase, a state of "anergy, with increased susceptibility to infection, was induced.

Similar results were reported from Germany by Berliner (quoted by Boisliniere) (19). This work corroborated the investigations of Morland (17) who some years previously found that during an attack of influenza the opsonic index of tuberculous patients was not much affected, whereas in the case of the non-tuberculous physician it was markedly lowered (to 0.68).

In some quarters (Warren loc cit) it was suggested

The late Dr. R. Murray Leslie (21) taking part in the "Discussion on Influenza" initiated by the "Royal Society of Medicine" (7) in November, 1918, regarded pulmonary tuberculosis "as a formidable late complication or rather sequel" of influenza and anticipated a rise in the tuberculosis figures three to eighteen months after the epidemics.

Samuel West (22) however, writing in January 1919 stated :-

"Influenza stands in no special relation to phthisis.

So far as can be judged it is rare for a patient, as a result of influenza, to become phthisical."

Later, in November 1919, Fishberg (6a) contended that influenza had no power to activate latent tuberculosis and recorded he had not met a single case of phthisis during the past year that could be ascribed to have followed influenza.

This unorthodox view was hotly combatted in America e.g. by Amberson & Peters, (23) Minor, (24) Berghoff, (25) Sloan, (26) Boisliniere, (19) Pottenger, (27a) and others.

Thus Minor wrote: "I am certain that influenza has caused a great increase in the incidence of tuberculosis and acted as an activator of latent tuberculosis in many people."

In some quarters (Warren loc cit) it was suggested

that Fishberg had expressed his views too hastily, i.e. before the true effects of the epidemic could be ascertained. (24) Barry King (25) Tenkesbury (30) Howe (32)

In favour of his contention Fishberg quoted the experience of Gram ~~(18)~~ who reported that of 33,880 cases of influenza reported in Buffalo, New York, 25,669 were visited and investigated after the epidemic had abated. Only 27 were found to suffer from tuberculosis. Of this number 11 had been notified before the epidemic began and in 8 the diagnosis of tuberculosis was not definitely established, i.e. they were merely suspects. Thus only 8 cases out of the 25,669 could possibly be regarded as having developed tuberculosis as a result of their attack of influenza. He also quoted figures to show that the notifications of tuberculosis in New York City between January 1st and September 1st 1919 were considerably fewer than in the corresponding period of 1918, and in a later paper (6b) published in 1921 he showed that there had^{been} a still further decrease in the mortality from pulmonary tuberculosis in New York during 1920.

In addition he laid special stress upon the number of cases of pseudo-tuberculosis which had come to his notice - cases which were really examples of a chronic type of broncho-pneumonia which eventually cleared up

satisfactorily.

This aspect of the question was also emphasised by Roubier (28) Barty King (29) Tewkesbury (30) Hawes (31) and others.

Fishberg also recalled the fact that any acute exacerbation in the course of pulmonary tuberculosis closely resembles an attack of influenza and is usually labelled as such (c.f. R. Murray Leslie (21) Marcus Patterson (34) etc.)

Armstrong (14) who enjoyed exceptional facilities at Framingham United States of America, for getting in touch with all cases of influenza in a relatively small community (17,00 persons) and for following them up at intervals, concluded that the epidemic had not been a conspicuous, responsible factor in increasing the prevalence of active tuberculosis.

Similarly, Burnand of Leysin (33) stated:-

"Le caractere "tuberculisant" de l'épidémie grippale de 1918 doit donc être considéré comme faible. Il est probablement moins marqué que ne le fut celui de l'épidémie de 1889-1890!"

In this country it is important to note that the notifications and deaths from pulmonary tuberculosis in 1919 showed a definite decrease as compared with 1918, and

the reduction in mortality has continued ever since.

Sir George Newman has suggested in explanation that the influenza epidemic of 1918 - 19 swept out all the "weak chests", i.e. killed off many who might have ultimately developed tuberculosis of the lungs had they survived.

3. THE INCIDENCE OF INFLUENZA ON THE TUBERCULOUS.

Here again the testimony is very conflicting. At the outset it must be stated that most of the articles published were written by physicians with sanatoria or hospitals under their care, and the views put forward were largely tinged by their personal experiences during the epidemic.

Some institutions escaped completely (Hawes 31), doubtless owing to their isolation, while in others the incidence on patients and staff was high, e.g. over fifty per cent during the October wave alone at the Lyster Sanatorium as reported by N. Lunde (34).

The good hygienic conditions prevailing as regards ventilation, satisfactory dieting and lack of overcrowding, combined with immediate medical supervision, probably accounted for the fact that influenza did not seem to spread very rapidly in some institutions devoted to the treatment of tuberculosis, and that those patients affected did not suffer so seriously as might have been anticipated.

Debre and Jacquet (35) and Pottenger (27b) believed as a result of their experience that the tuberculous possessed a definite immunity against influenza and this view was supported, largely on theoretical grounds, by Dorn (26), Amelung (28) and others.

The majority of writers maintained, however, that under similar conditions as to exposure to infection and contact etc., the tuberculous were at least as susceptible to the virus of influenza as healthy individuals (e.g. Fishberg (6a), Burnand (33b), Pearl (37), Klein (38) and others.

4. THE EFFECTS OF INFLUENZA ON THE TUBERCULOUS

The Summer wave, July 1918, does not appear to have affected the tuberculous very seriously anywhere, but the effects of the two succeeding waves, (October and November 1918 and February-March 1919) gave rise to much divergence of opinion and controversy.

In a letter to the Editor of the "Lancet", February 1919, Dr. M. Macrae (39) expressed the opinion that chronic diseases of the lung, including pulmonary tuberculosis, conferred a certain degree of protection against influenza.

In the following issue of the "Lancet" the present writer (40) recording his experiences in Newcastle-upon-Tyne stated that the subjects of "open" pulmonary tuberculosis had come through the epidemic remarkably well and conjectured that the "mixed" infection of "open" phthisis

had resulted in considerable immunity against the streptococci and pneumococci which were responsible for the serious complications that proved so fatal".

In the same number of the "Lancet" (20) the subject was discussed in an editorial "The Disadvantage of being Healthy".

Later the bacteriological side of the question was considered in an exhaustive manner by Donaldson, in Crookshank's "Essays" (12), and this writer showed that the pneumococci, streptococci (haemolytic and other varieties), staphylococci, and even the Pfeiffer's bacillus found in the lungs of persons dying, after influenza were almost identical with the organisms found in the sputum of living tuberculous patients and in the cavities in the lungs, after death.

Berty King (29) and others also emphasised the importance of the "mixed infection" of pulmonary tuberculosis in determining the different effects of influenza upon the subjects of phthisis.

Fishberg's view that "influenza in phthisical patients is not likely to run a more acute, severe and fatal course than in others" has already been quoted, and in favour of his opinion he cited the experiences of MacRae in South Africa, Dickinson in Newcastle, Gerber and Schlesinger in Vienna and Rickmann in Germany.

The effects of the epidemic at the Lyster Sanatorium, Norway as recorded by N.Lunde (34), contrasted sharply with the above however. Out of 128 patients in this institution 68 were, in October 1918, attacked by influenza and 30 developed pneumonia, with fatal results in 13 cases - a mortality of over 20 per cent.

None of the patients in the first stadium died, but amongst the advanced cases (Stadium III) the fatality rate was 77.8 per cent.

Although the incidence of the disease on the staff was similar to that on the patients generally, no deaths occurred.

The experience of Würtzen (41) at the Öresund Hospital coincided with that of Lunde, namely that the gravity of an attack of influenza varies with the severity and extensiveness of the tuberculosis.

It is noteworthy that 5 out of 13 patients undergoing treatment by artificial pneumothorax at the Lyster Sanatorium died of influenza and similar observations have been made by Burnand (33.c.) Guth (42), Tillisch (43), Weill (28), Fernandez (44) and others.

Ménard (50) in a paper read before the Medical Society of the Paris Hospitals expressed the view that the prognosis

of influenza in tuberculosis was always serious; but in the subsequent discussion Professor L. Bernard considered that Ménard's experience was altogether exceptional.

Amberson & Peters (23) and Berghoff (25) instanced cases of arrested or healed tuberculosis who became worse after influenza and coughed up sputum containing tubercle bacilli.

Burnand (35a) considered that fifteen to twenty five per cent of his tuberculous cases suffered a considerable re-activation of their tuberculous lesions as the result of an attack of influenza, but this was usually mild and transient, and acute tuberculosis, with a fatal termination, was a rare exception.

However it was natural to expect that an acute illness such as influenza would hasten the fatal termination of many advanced and progressive cases of lung tuberculosis and that this was so is strongly suggested by the great increase of deaths from pulmonary tuberculosis in England and Wales during the second half of 1918 as compared with the corresponding period of the preceding and following years (9).

Moreover it is interesting to find from the detailed figures given by the Registrar General that influenza proved twice as fatal to the subjects of organic disease

of the heart as compared with the tuberculous, the respective totals of the associated deaths between July 1st, 1918 and March 31st 1919 being :-

Influenza & Heart Disease 4,853

Influenza & Tuberculosis 2,427

LOCAL EXPERIENCES AND INVESTIGATIONS.

As in other parts of Britain, the great epidemic of 1918 - 19 appeared in Newcastle-upon-Tyne in three distinct waves.

The first (June & July 1918) was relatively mild and most of the cases were of the three-day type but 127 deaths were ascribed to it (9).

The second occurred in October, November and December 1918, and the patients affected were more seriously ill, and more prone to pulmonary complications, with the result that 577 persons died.

The third wave followed almost immediately on the second and the cases were, as in Scotland, of a still more severe type, with 595 deaths.

A notable feature was the very large number of deaths of children below five years of age.

According to the Registrar General's Report (9) Newcastle-upon-Tyne occupied the twenty-sixth position in the list showing the mortality from influenza, during the

three waves, in the 82 County Boroughs in England and Wales, Barnsley being at the top with the largest number of deaths and Bournemouth at the bottom with the lowest.

With regard to the separate waves of the epidemic, Newcastle stood twenty-sixth, sixty-fourth and third in the first, second and third respectively.

Thus Newcastle suffered relatively severely in the third epidemic, and it was reported by Dr.H.Kerr, Medical Officer of Health (46) that during the week ending February 22nd, 1919, the general death rate was equivalent to an annual one of 67.9 per thousand inhabitants.

It must be remarked that the number of deaths ascribed to the epidemic by the Medical Officer of Health was 1961, whereas the Registrar General's figure was 1299.

Which ever figure is accepted, such a pestilence had never been recorded in the statistical annals of the City.

Nevertheless, terrible as it seemed at the time, it fades into insignificance when compared with the ravages of the plague.

Thus it is stated by Forster (47) that in 1636 (when the population of Newcastle-upon-Tyne cannot have exceeded 17,000) :-

"The plague broke out again in Newcastle with such fury

"that there died in all of this tremendous visitation, between the 6th May and the 31st December, 1636, no less than 5037 persons.

"All trade was at a stand in Newcastle and there is a tradition that the streets of that town were covered with grass; the highways were unoccupied."

Such a record should make the present generation thankful for the progress and triumph of Preventive Medicine.

To return to the influenza, however, the prevalence of the disease quickly abated after April 1919.

Only slight recrudescences occurred at intervals till December 1921, when a sharp and serious outbreak appeared, causing much sickness and many deaths.

In March 1919, a special investigation was undertaken by Dr. S. J. Clegg, Assistant Medical Officer of Health (48), on the lines of a house to house enquiry, in two selected quarters of the city, and from this it would appear that about twenty per cent of the population suffered in one or other of the waves, and that one attack of the disease conferred a certain degree of protection against a subsequent attack.

On the twenty per cent basis there would be 55,000

the institutions devoted to the care of tuberculous patients.

cases all told, and as the total number of deaths ascribed to ^{the} epidemic by the Registrar General was 1299, the case fatality rate works out at 2.4 per cent.

INFLUENZA AND TUBERCULOSIS.

It has been said that every research worker must be imbued with a certain amount of scepticism, so when this unique opportunity offered, all the resources of the Tuberculosis Dispensary were mobilised with the object of testing the preconceived notions regarding the inter-relations of influenza and tuberculosis, especially pulmonary tuberculosis.

The work undertaken consisted of :-

- (a). An enquiry, commenced in February 1919, to ascertain the incidence of influenza and pneumonia on patients attending the Dispensary and their home contacts.
- (b). A "follow up" of all the Dispensary cases included in the previous investigation, and also of all patients who were reported to have had pneumonia.
- (c). Special enquiry by the visiting nurses in 1920 as to the incidence of influenza on cases known to be sputum positive prior to April 1919.
- (d). An enquiry, in March 1922, similar to (c) but including "negative" cases also.
- (e). Study of the prevalence and type of influenza in the institutions devoted to the care of tuberculous patients.

- (f). Home visitation by the nurses of all cases of pneumonia notified between January 1st, 1919 and June 30th, 1920, all suspicious cases being referred to the Tuberculosis Dispensary for examination.
- (g). Review of all notifications of pneumonia received by the Medical Officer of Health between January 1st, 1919 (date on which pneumonia became notifiable) and December 31st, 1922; and comparison with the tuberculosis notification register.
- (h). Investigation of the Tuberculosis Notification Register to see whether there was any increase in the number of cases of pulmonary tuberculosis notified after the subsidence of the epidemic.
- (i). Scrutiny of the death returns to find out the effect of the epidemic upon the mortality from tuberculosis and to ascertain in how many cases influenza and tuberculosis were associated in the same death certificate.
- (a). The Dispensary Enquiry was instituted on February 10th 1919, and continued till March 8th, 1919, after which date it had to be abandoned owing to the fact that several members of the staff were affected by the disease, one developing broncho-pneumonia.

Particulars were registered of 536 consecutive patients consisting of definite cases of tuberculosis (105 sputum - positive) "suspects" and contacts.

200 or 37.3 per cent stated that they had suffered from

influenza, whereas of the 2386 other members of their households 616 or only 25.8 per cent gave a history of having had the disease since June 1918.

Thus of the 2922 persons included in the scope of this investigation 816 were reported to have had influenza, and of these 41 had pneumonia with 19 deaths giving a pneumonia incidence of 4.8 per cent and a case fatality rate of 2.3. per cent which is almost identical with the figure (2.4 per cent) estimated on Dr. Clegg's figures (vide supra).

Of the 105 sputum positive patients 33 reported attacks i.e. an incidence rate of 31.5 per cent.

However 48 per cent of the households of the sputum positive cases escaped the infection entirely as contrasted with only 30 per cent of those of the negative cases.

According to Dr. Clegg's figures 527 out of 970 (54 per cent) of the households were not affected.

As a result of this enquiry it may therefore be concluded that the Dispensary patients certainly exhibited no degree of immunity to influenza.

The lesser incidence on the households of the "sputum-positive" cases as contrasted with the "sputum-negative" patients, may perhaps be explained on the grounds that the former class led more sheltered lives and took greater pre-

visiting nurses were directed to make special enquiry as to

cautions to avoid infection.

(b). "Follow Up". All the 536 Dispensary cases included in the previous enquiry have been kept under continuous supervision ever since.

Many of the sputum-positive cases appeared to suffer a definite aggravation of their tuberculous disease as a result of the attack of influenza.

In only 7 of the 431 cases classed as "negative" at the time of the original enquiry, have tubercle bacilli been found up to date.

These 7 patients all had definite physical signs of pulmonary tuberculosis previously, and it is significant that only one of them admitted an attack of influenza during the epidemic.

The 22 patients who survived the attack of pneumonia have practically all been examined at the Tuberculosis Dispensary and up to the present time (March 1923) none has developed clinical tuberculosis.

While the definite cases were sometimes adversely affected by the intercurrent disease, there is no real evidence, from this particular investigation, that the epidemic played an important part in kindling latent tuberculosis into activity.

(c). Incidence on the Tuberculous. Early in 1920 the visiting nurses were directed to make special enquiry as to

the incidence of influenza during the epidemic upon the sputum-positive cases entered on the Dispensary Register prior to April 1st, 1919.

The information was obtained in respect of 286 patients (215 males and 71 females). 71 persons reported mild attacks and 62 severe attacks while only 153 stated that they had not suffered from the disease.

This gives an incidence rate of 46.5 per cent, very much higher than the figures given earlier (31.5 per cent) - but it is perhaps to be explained on the grounds that every exacerbation of the tuberculous process in the lung was regarded as influenza; for some of the patients stated that they had had several attacks.

Thus again there was no evidence that the definitely tuberculous possess any degree of relative immunity towards influenza - rather the reverse indeed.

(d). The Epidemic of December 1921 - 9 January 1922 was much less serious than that of 1918 - 19, but in March 1922 the visiting nurses, investigating the incidence of influenza on the patients in their respective areas, found that the sputum-positive cases reported attacks more than twice as frequently as the "negatives".

Thus of 552 "positives" 79, or 14.3 per cent, stated that they had suffered from influenza during December 1921

or January 1922 compared with 80 (6.6 per cent) of 1207 "negatives" visited.

The number of attacks reported in the two categories being practically equal, it is important to note that six of the "positive" cases died and only one of the "negatives".

The obvious deductions from this enquiry therefore are that the definite cases are more susceptible to the disease and, when affected, suffer more severely. The value of the foregoing investigations, it must be admitted, is somewhat discounted by the fact that the patients reporting attacks were not under the writer's supervision during the acute illness, and it was necessary to rely upon the history given by them.

(e). Institutions. The ideal place for observing the incidence and effects of epidemic influenza on the tuberculous is in institutions specially devoted to their care, but the patients in the Tuberculosis Wards at the City Hospital (62 beds) and Barrasford Sanatorium (with an average of over 90 inmates) were fortunate enough to escape both epidemics almost completely; only one patient (at the City Hospital) being affected, slightly, and with no serious after effects.

Barrasford Sanatorium is, of course, very isolated being 5 miles from a railway station and that would account

for its apparent immunity. — observations as regards

The only one of the staff attacked was the Medical Superintendent who visits Newcastle at least once a week. (49)

It is difficult, however, to explain why the incidence on the patients in the City Hospital was so light because the staff suffered severely. The average number of female staff (sisters, nurses and maids) was 85, and during the 1918 - 19 epidemic 43, or just over 50 per cent were attacked and 33 were "warded". One of the sisters died.

Strangely enough the actual incidence of the disease was heavier on the domestic than on the nursing staff - a curious anomaly also reported by BartyKing (29).

Presumably the "epidemic constitution", to use the expression of the older epidemiologists, prevailing in the tuberculosis wards at the time was not favourable to the spread of the disease.

The excellent hygienic conditions under which the patients' lived, especially as regards thorough ventilation and ample floor space, no doubt contributed to the happy result.

The nurses tending the sick staff who had been "warded" showed no greater liability to contract the disease than those working in the other wards.

The net result of these observations as regards institutions is only to emphasise the extraordinary and inexplorable vagaries of this most mysterious infection.

(f). Notifications of Pneumonia/1919. Influenza did not come within the category of "notifiable" diseases in this country, but on January 1st, 1919 compulsory notification of "primary" and "Acute Influenzal - Pneumonia" was introduced. A unique opportunity was thus offered to follow up a large series of cases of pneumonia and investigate their subsequent progress with special reference to tuberculosis. Accordingly, a reasonable interval having been allowed to elapse, particulars of all the cases notified as suffering from pneumonia in Newcastle during the year 1919, were obtained from Miss Cameron the Chief Health Visitor.

604 forms were received and lists were prepared of the names and addresses. These were handed to the Dispensary Nurses for visitation and report.

Many of the patients were found to have died of the original disease and some could not be traced, but 394 were investigated, 113 ^{notified} as acute influenzal pneumonia and 27 as pneumonia after other diseases.

16 had attended the Tuberculosis Dispensary prior

to the attack of pneumonia which was recorded as "lobar" in 3 instances and "acute-influenzal" in 13. 5 of the 16 had had tubercle bacilli discovered in their sputum previously and 2 of them died of the pneumonia, while the disease was aggravated in the remaining 3 cases.

None of the others (11) has, up to date (March 1923) developed clinical pulmonary tuberculosis.

The Nurses discovered, on their rounds, that a great aftermath of ill health had followed on the original disease, and 167 patients stated (in July 1920) that they had not fully recovered from the effects of their attack of pneumonia in the previous year.

27 patients, of whom 11 had been notified as suffering from "primary" and 16 "acute influenzal pneumonia", were persuaded to attend the Tuberculosis Dispensary and 3 definite cases of tuberculosis, with tubercle bacilli in the sputum, were discovered (2 after influenza and 1 after primary pneumonia). 4 others (all post-influenzal) were notified as tuberculous subsequent to their attack of pneumonia but in none of these cases was the diagnosis upheld after prolonged observation.

One of these cases (G. McK. aged 18 years) was typical of the post-influenzal pseudo-tuberculosis so frequently mentioned in the literature. When first seen on March 19th

1919 she stated that she had had an attack of influenza seven weeks previously followed by pneumonia. She complained of cough, with sputum, general weakness and pain in the chest; the general condition was poor and her appearance "hectic" the temperature (forenoon) being subnormal and the pulse rate 132 per minute. On examination of the chest it was found that the percussion note was impaired over the apices of both lungs especially the right, and also over the bases. The expiratory murmur was prolonged over the summit of the left lung and a few sibilant and crepitant rales were heard over the upper lobes and the right base, where the breath sounds were much diminished in intensity. She appeared to be a case of acute phthisis supervening on influenza, but microscopical examination of the sputum failed to reveal the presence of tubercle bacilli. She continued to improve steadily and nine months later no abnormal signs could be detected in her chest.

In addition to the three definite cases above mentioned, who visited the Dispensary, three other patients notified as suffering from acute influenzal-pneumonia were notified as suffering from pulmonary tuberculosis and died without the writer getting an opportunity to go thoroughly into their cases.

In one case at least, aged 15 years, the correctness of the original diagnosis of pneumonia is not above suspicion; for it seems probable that she suffered from acute pulmonary tuberculosis from the outset as she died within five weeks after being notified as a case of pneumonia.

However, if this patient be included only 6 cases of pulmonary tuberculosis could possibly be regarded as having followed pneumonia out of the 394 notified cases investigated.

Only 1 case followed primary pneumonia out of 204 notifications as compared with 5 cases after acute influenza pneumonia of which 113 notified cases were investigated.

From this enquiry it would appear therefore that patients notified as suffering from acute influenza pneumonia are much more likely to contract tuberculosis later than those notified as cases of primary pneumonia.

The number of instances in which tuberculosis did follow was very small and it cannot be deduced that influenza was a serious factor in activating latent tuberculosis during 1919.

(g). Notifications/1919 - 22. As the results of the investigation made in July 1920 were largely of a negative

character, in February 1923 all the notifications of pneumonia received by the Medical Officer of Health during the years 1919, 20, 21 and 22 were reviewed and checked with the Tuberculosis Notification Card Index Register.

The total number of notifications was 3248 and the details for each year are given in the table which follows:-

year	Primary	acute Influenzal	Total
1919	425	193	618
1920	804	71	875
1921	538	48	586
1922	924	245	1,169
Total	2,691	557	3,248

It was found that notifications of both tuberculosis and pneumonia had been received in respect of 70 patients; in 23 instances tuberculosis was the prior notification; in 47 cases the notification of pneumonia was the first to be registered

year	Total notification of Pneumonia	also notifications of Tuberculous Sub.	Prior	Subsequent
1919	618	22	7	15
1920	875	20	4	16
1921	586	12	5	7
1922	1,169	16	7	9
Total	3,248	70	23	47

Of the 23 cases previously notified as tuberculous, the type of pneumonia was stated to be acute influenzal in 10 instances and primary in 13.

found after examination and observation at the Dispensary

In 11 cases the diagnosis had been verified bacteriologically and in every instance the tuberculous disease was aggravated by the pneumonic process, 8 of the patients being dead at the time of writing March 1st 1923.

Each type of pneumonia appeared to have the same deleterious effect on the patients, but the acute influenzal variety was more common (8 influenzal to 3 "primary").

With reference to the 12 "negative" cases, 10 have been examined at the Dispensary and the diagnosis of tuberculosis was not upheld - some chronic non-tuberculous lung disease being found in most of them.

Two died before they could be examined but, as the notifications of pneumonia and tuberculosis were practically simultaneous (within 3 days of each other in both cases), they can be disregarded for the purpose of this enquiry.

Thus in four years only 11 definite cases of pulmonary tuberculosis were reported to have contracted pneumonia after notification and in every instance the tuberculosis was aggravated in consequence. 8 of the 11 cases were notified as suffering from acute influenzal pneumonia.

Turning now to the 47 cases notified as tuberculous subsequent to the reported attack of pneumonia, it was found after examination and observation at the Dispensary

that 19 were not really suffering from clinical tuberculosis.

16 were verified bacteriologically, but in 4 cases the notifications of pneumonia and tuberculosis were practically simultaneous and it can be inferred that the so called pneumonia was in reality a tuberculous process from the outset.

Of the remaining 12, 2 are alive and appear to be definitely tuberculous but the other 10 are all dead and in respect of several of them the correctness of the diagnoses is open to doubt.

5 at least of the notifications were "simultaneous" (vide supra) and cannot properly be reckoned in the total of cases of tuberculosis following pneumonia.

The details are shown in tabular form below :-

Type of Pneumonia	Total number	Tuberculous	Probably Tuberculous	Possibly Tuberculous	Not Tuberculous	Simultaneous
Primary	29	6	1	1	13	8
Acute Influenzal	18	6	1	4	6	1
Total	47	12	2	5	19	9

The net result is that not more than 19 persons out of the 3248 notified as suffering from pneumonia 1919 - 22 could possibly be regarded as having contracted tuberculosis as a result of the attack of

Many cases of tubercle of the lung, however, begin very acutely, with symptoms resembling influenza, 2 probably and 5 possibly, tuberculous.

Only 11 cases of the 557 reported to have had patients who thought that their illness originated in acute influenzal pneumonia contracted tuberculosis; an attack of influenza.

the proportion of cases developing tuberculosis after an attack of primary pneumonia is still smaller (8 out of 2691).

The deductions from this investigation are similar to those made from the previous enquiry (f) namely that while acute influenzal pneumonia is more frequently followed by tuberculosis than is primary pneumonia, it does not appear to be a serious factor in increasing the morbidity of pulmonary tuberculosis, frequently follows influenza.

However, a large number of patients are of opinion that the pulmonary tuberculosis from which they suffer originated after an attack of influenza.

Thus the case sheets of all the sputum positive cases entered on the Dispensary Register between June 1st 1918 and June 30th 1920 were looked up and it was discovered that out of a total of 502 patients 80 or 15.9 per cent cited an attack of influenza as the starting point of their illness.

It seems difficult to reconcile these figures with the deductions from enquiries (f) and (g).

Many cases of tubercle of the lung, however, begin very acutely, with symptoms resembling influenza, and this probably accounts for the large number of patients who thought that their illness originated in an attack of influenza.

In this connection it may be noted that many observations by the writer lead him to believe that such an acute attack of tuberculosis often results in extensive lesions in both lungs, and that, in consequence very many cases of pulmonary tuberculosis are already in the third stage of Turban's classification by the time they are recognisable and may very readily be mistaken for some form of pneumonia such as that which so frequently follows influenza.

A typical instance of this may be quoted. A young girl (E.H.) aged 18 years with no family history of tuberculosis was notified as a case of pneumonia on July 26th, 1921 and was admitted to Hospital two days later.

She stated that she had had influenza four weeks previously i.e. during a non-epidemic period. On the case sheet it is recorded that crepitations were heard over the left lower lobe. Her temperature was somewhat irregular though never very high, possibly owing

to the fact that it was taken in the axilla. The pulse was uniformly rapid and on the day before her discharge from hospital, August 22nd, was 120 per minute. As she did not "pick up" at home she was referred to the Tuberculosis Dispensary two months later, viz on October 25th 1921, and was found to have extensive infiltration of both lungs, the left being more involved. The sputum was found to contain numerous tubercle bacilli. She was acutely ill and the pulse rate was 132 per minute. With rest in bed the activity of the disease was subdued to some extent, but she never rallied completely and died on September 7th, 1922.

(The writer is indebted to the Resident Medical Officer at the City Hospital for Infectious Diseases for the notes on, and temperature charts of this patient during her stay in hospital).

This case illustrates typically the pseudo-influenza which so frequently ushers in active pulmonary tuberculosis.

Milder examples occur in the course of treatment by artificial pneumo-thorax; namely when an effusion forms, this being a fairly common incident during treatment by this method.

Thus in addition to the post-influenzal pseudo-

tuberculosis, previously described, there is a tuberculous pseudo-influenza.

Hence it is that so many phthisical patients state that their first symptom was an attack of influenza which was in reality, in many, if not most of the cases, an acute attack of tuberculosis.

(h). Study of the Notifications. of Tuberculosis / It had been predicted by Minor (24), Murray Leslie (21), and others that there would be a great increase of pulmonary tuberculosis following the severe epidemic of 1918 - 19.

A study of the figures, however, shows that there was no increase in the number of notifications of pulmonary tuberculosis received, as will be seen from the table below:

year	1 st Half	2 nd Half	Total
1918	316	236	552
1919	298	221	519
1920	328	265	593
1921	285	247	532
1922	266	229	495

There is, therefore, no reason to believe that any considerable number of new cases of pulmonary tuberculosis originated as a result of the influenza epidemic of 1918 - 19.

(i). Death Returns. Every week the Medical Officer of Health is supplied with a list of deaths occurring in the City; in addition to identification particulars the cause of death, as entered on the death certificate, is given.

These lists were carefully scrutinised during the epidemic periods and it was found that in only very few instances were influenza and pulmonary tuberculosis associated in the same certificate.

During the 1918 - 19 epidemic there were only 15 deaths registered in Newcastle-upon-Tyne of Newcastle residents as due to tuberculosis of the lungs and influenza and two of the certificates related to non-residents who died in institutions.

In addition there were 6 deaths from pulmonary tuberculosis and pneumonia not definitely stated as following influenza; two of these were of non residents.

Thus if the pneumonia is regarded as a sequel of influenza in all cases only 18 deaths of Newcastle residents suffering from pulmonary tuberculosis can be truly ascribed to the 1918 - 19 epidemic according to the death certificates.

In January and February 1922 pulmonary tuberculosis

and influenza were associated in only 5 death certificates; in 4 cases the cause of death was given as phthisis and pneumonia.

It would, therefore, appear that relatively few phthisical patients died directly of acute influenza supervening on their tuberculous disease.

As a general rule the number of deaths in the second half of the year is considerably fewer than in the first six months, but this was not the case in 1918.

The half yearly figures for 1918 and the two years preceding and following it are tabulated below:-

year	1 st Half	2 nd Half	Total
1916	216	172	388
1917	245	138	383
1918	180	184	364
1919	190	110	302
1920	188	154	342

It will be observed that, contrary to the usual experience, the number of deaths during the second half of 1918 actually exceeded the number of deaths in the first half; it seems only reasonable, therefore, to conclude that the excess mortality of the latter half of 1918 was, in part at least, the result of influenza hastening the fatal termination of some of the

cases of phthisis who had a very slender hold on life.

The number of deaths from pulmonary tuberculosis in the first half of 1919 was higher than during the same period of 1918 and 1920 which also suggests the same explanation.

During the second half of 1919 the deaths from pulmonary tuberculosis were exceptionally few and here again the most obvious explanation is that many of the patients who would normally have died during this period had died earlier, due to aggravation of their disease by influenza.

In 1922 there was no definite increase in the phthisis mortality registered during or after the relatively mild epidemic; indeed the number of deaths certified as due to pulmonary tuberculosis in Newcastle-upon-Tyne was the smallest on record.

An account of the epidemic as it occurred in Newcastle-upon-Tyne is given; also the results of an enquiry by the Assistant Medical Officer of Health.

Special investigations undertaken by the writer to test the traditional views were recounted.

These consisted of :-

- (a). An enquiry, commenced in February 1919, to ascertain the incidence of influenza and pneumonia on patients

SECTION III

SUMMARY AND CONCLUSIONS.

S U M M A R Y

Quotations from standard text-books on Medicine are presented to show that before the great pandemic of 1918 - 19 influenza was regarded as a frequent exciting cause of pulmonary tuberculosis and as a serious complication of pre-existing tuberculosis.

The recent literature of the subject is reviewed under four headings namely :-

- (1). Influenza in General.
- (2). Influenza as an Activator of Latent Tuberculosis.
- (3). Incidence of Influenza on the Tuberculous.
- (4). The Effects of Influenza on Tuberculous Patients.

Great divergency of opinion as to the inter-relations of influenza and pulmonary tuberculosis is found to exist.

An account of the epidemic as it occurred in Newcastle-upon-Tyne is given; also the results of an enquiry by the Assistant Medical Officer of Health.

Special investigations undertaken by the writer to test the traditional views are recounted.

These consisted of :-

- (a). An enquiry, commenced in February 1919, to ascertain the incidence of influenza and pneumonia on patients

attending the Dispensary and their home contacts.

- (b). A "follow up" of all the Dispensary cases included in the previous investigation, and also of all patients who were reported to have had pneumonia.
- (c). Special enquiry by the visiting nurses in 1920 as to the incidence of influenza on cases known to be sputum positive prior to April 1919.
- (d). An enquiry, in March 1922, similar to (c) but including "negative" cases also.
- (e). Study of the prevalence and type of influenza in the institutions devoted to the care of tuberculous patients.
- (f). Home visitation by the nurses of all cases of pneumonia notified between January 1st, 1919 and June 30th, 1920, all suspicious cases being referred to the Tuberculosis Dispensary for examination.
- (g). Review of all notifications of pneumonia received by the Medical Officer of Health between January 1st, 1919 (date on which pneumonia became notifiable) and December 31st, 1922; and comparison with the tuberculosis notification register.
- (h). Investigation of the Tuberculosis Notification Register to see whether there was any increase in the

number of cases of pulmonary tuberculosis notified, after the subsidence of the epidemic.

- (i). Scrutiny of the death returns to find out the effect of the epidemic upon the mortality from tuberculosis and to ascertain in how many cases influenza and tuberculosis were associated in the same death certificate.

The results of these investigations allow of the following deductions :-

- (1). The Dispensary patients were attacked by influenza at least as frequently as their home contacts and the population at large.
- (II). The inmates of Barrasford Sanatorium escaped entirely owing to the isolation of the institution.
- (III). It is difficult to explain why only one patient in the Tuberculosis Wards at the City Hospital was attacked while the staff suffered severely.
- (IV). Many of the definite cases suffered an aggravation of their disease as a result of an attack of influenza and two patients with an artificial pneumothorax died of acute influenzal pneumonia.
- (V). The incidence of pulmonary tuberculosis as evidenced by the notifications was not increased after the pandemic.
- (VI). While 15.9 per cent of the sputum-positive patients

ascribed their pulmonary tuberculosis to influenza it has to be borne in mind that at least 20 per cent of the population suffered from an attack of influenza during the 1918 - 19 epidemic.

(VII). Many patients after an attack of acute influenzal pneumonia present signs which are apt to be confused with that of pulmonary tuberculosis. These chronic broncho-pneumonia conditions usually clear up completely.

(VIII). In many instances the acute onset of tuberculosis is mistaken for an attack of influenza especially when there is no family history of phthisis.

(IX). While patients notified as suffering from acute influenzal pneumonia are relatively more liable to become tuberculous later, than those notified as suffering from primary (or lobar) pneumonia, the total number is really insignificant.

(X). During, and immediately after, the 1918 - 19 epidemic the death returns revealed an increase in the number of deaths from pulmonary tuberculosis; this increase can, in part at least, be ascribed to influenza.

CONCLUSIONS.

- (1). Acute influenzal pneumonia was found to be followed by pulmonary tuberculosis in a greater proportion of in-

stances than lobar pneumonia; the total number of cases however, was small and there is no evidence that influenza proper was a serious factor in increasing the morbidity of tuberculosis.

(2). Post-influenzal pseudo-tuberculosis and tuberculous pseudo-influenza caused considerable confusion in diagnosis.

(3). Under similar conditions of contact and exposure to infection the tuberculous were just as liable to contract influenza as healthy persons.

(4). Influenza frequently caused aggravation of the lung lesions and undoubtedly hastened the fatal termination of many cases of progressive pulmonary tuberculosis.

(5). The safest place during the epidemic was in one of the wards of a properly equipped and well ventilated hospital.

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A P P E N D I X.

Forms specially designed by the writer for Dispensary work.

- A. Page of Appointment Book with patient's card inset and front of envelope for containing latter.
- B. Page of Dispensary Register.
- C. Case Sheet.
- D. Environmental Record.
- E. Panel cut out of front of folder to show
 - (a). Identification particulars.
 - (b). Forms for sputum examinations.
- F. Page of Notification Register.
- G. Cards used for indexing notifications (Names & Streets).
- H. Form for weekly list of notifications.
- I. Enquiry form used after deaths from Tuberculous Meningitis.
- J. Daily Record Sheet.
- K. Form used for recording progress of patients receiving treatment by Artificial Pneumothorax.

Appendix A

[illegible]

ATTENDANCE CARD.

REMEMBER.—Always bring this Card with you.

For the convenience of all those concerned it is essential that the hour of appointment be **STRICTLY** adhered to.

IMPORTANT.—If this Card is lost will the finder please return it to 91, New Bridge Street, Newcastle-upon-Tyne.

Appendix B

DIAGNOSIS.	

City and County of Newcastle-upon-Tyne.

TUBERCULOSIS DISPENSARY.

Appendix C

No.

DATE

Age

NAME

Height

Occupation M.S.W.

Weight

Duration of illness with first symptom

Standard Weight

Complaints of Cough, Spit, Hæmoptysis, Night Sweats, Loss of Weight, Dyspnœa, Weakness, Vomiting, Diarrhœa.

Pain

HISTORY :—Personal. Pleurisy c effusion

Fistula in Ano

Previous treatment.

Family.

EXAMINATION :—General. Temperature

Respiratory. Inspection

V.F. V.R.

Percussion

Auscultation

Larynx

Alimentary. Teeth Tongue

Hæmopoietic. Tonsils

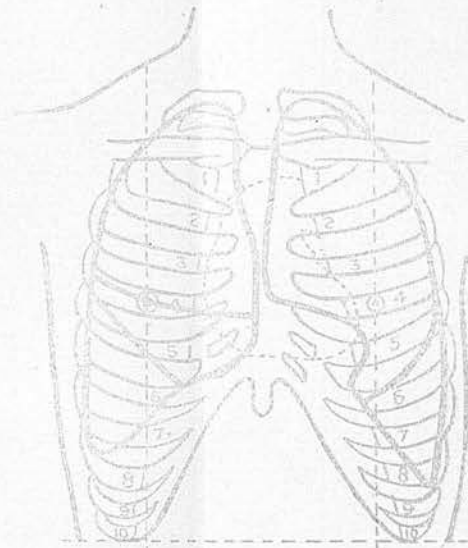
Circulatory. Pulse Arteries

Urinary. Sp. Gr. R. Alb. Sugar. D.

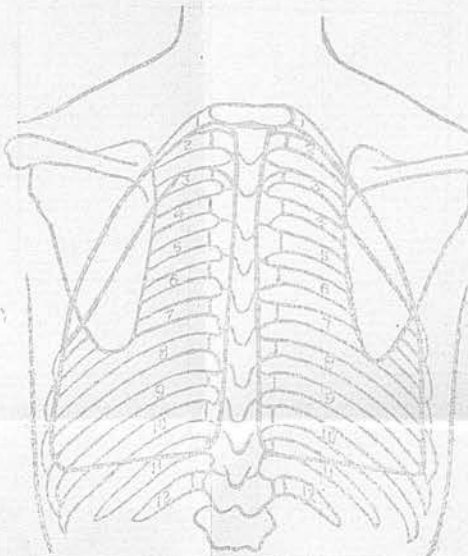
Locomotory. M.I. Fingers

Other Systems. Catamenia Pupils.

Recommendation.



NOTATION.



SPUTUM.

AMOUNT.		CHARACTER.	

RECORD OF PERSONAL AND DOMESTIC PARTICULARS AND NURSES VISITS.

Appendix D.

T.B.

Name

Notified By Ward

Part affected M.S.W. Age

Date of Enquiry Dispensary No.

Is Patient an Insured Person, Dependent, or Uninsured?

Address

..... Doctor in Attendance

* Places of Residence during last five years

..... Birth-place

First Symptom with date

* Has Patient suffered from Pleurisy, Bronchitis, Pneumonia, Chronic Cough, Spit, Hæmoptysis, Fistula?

* Special treatment received (Hospital, Sanatorium, Tuberculin, etc.)

* Is there any family history of Tuberculosis (Lungs, Bones, Joints, Glands, Meninges, etc.)?

Occupation

Where Employed

Able to (a) Work (b) Attend School If not, how long?

* Previous Occupations

* Any exposure to unfavourable conditions at work or elsewhere?

No. of Dwelling Rooms Type of House No. of Inmates

Ages and Sex of Household: M F

General Health of Household

Does Patient sleep alone (a) in bed? (b) in room?

Are proper precautions taken to dispose of sputum, disinfect handkerchiefs, etc.?

Sanitary condition of Premises (Ventilation, Light, Dampness, etc.)

Any further remarks?

* Give dates when possible.

Insured Person,
dependant or otherwise }

Appendix E

Date of Notification

Date of Booking

Age

Patient's Name

Ward

Address

By whom Notified

Localisation of Disease

Doctor in Attendance

Recommended by

Room to Self

Separate Bed

No. of Inmates

No. of Rooms

Appendix E

Appendix F

NOTIFICATION OF TUBER

Appendix C.

Appendix B.

Surname

Address

NOTIFICATION OF TUBERCULOSIS.

(NURSES LIST.)

Appendix H

District.

Week ending

A 12798—E. & B.

[illegible]

Appendix I
Enquiry after Tuberculous Meningitis.

Name:

Address: *Ward:*

Date of Death: *Age:*

Date of Notification:

1. Duration of illness :
2. Mode of onset (sudden or gradual), }
outstanding symptoms, etc. }
3. Health prior to Meningitis (especially as to T.B.):
4. Any relations with Pulmonary T.B. ?
5. Any relations dead of Pulmonary T.B. ? {
(Give age at death, and date.) }
6. Has patient been in contact with any other {
case of Pulmonary T.B. ? }
(State degree of contact.) }
7. Any contacts with other forms of T.B. ?
8. Any cases of T.B. notified from same address ?
9. Number in holding: Of rooms.....; of inmates.....
10. General cleanliness of premises : {
.....
.....

Date of Report : *Signed :*

DAILY RECORD.

Month of Appendix J 19

[illegible]

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